NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan Limassol Municipality

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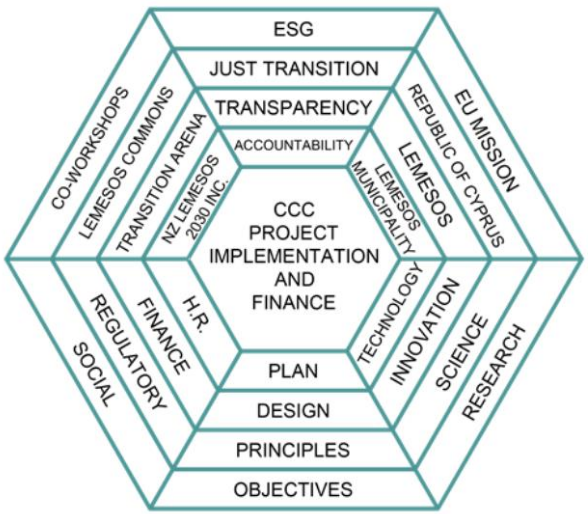
Summary

An abstract **summarizes the content** of the 2030 Climate Neutrality Action Plan (Action Plan) that is developed jointly by local authorities, local businesses and other stakeholders.

Textual element

AP Summary

This first version (15SEP23) of the Action Plan (AP) of the Lemesos (Limassol) Climate City Contract is the result of a long series of consultations, public discussions, and focused workshops (September 2022 – September 2023) among city citizens, stakeholders, scientific thematic teams, city and central government political leaders and the Lemesos municipality (internal) transition team. The central coordination team was also greatly supported by the Mission City Advisor Mr. Bob D'Haeseleer, the Mission Summer School in Italy, the economic model consultant Mr. Sean Murray, Mr. Chrysses Nicolaides of the Mission Board, and professional financial consultants.



The six facets of the transition plan

The action plan is built around objectives, principles, and methods; thematic action emission-reducing portfolios further analysed into more detailed activities and projects; innovative instruments for effective governance and citizen and stakeholder participation; and analysis of impact pathways, barriers and risks, opportunities and MEL approach including KPIs. The figure depicts the multiple facets taken into account.

The objective is for Lemesos to become climate neutral by 2030 in an inclusive, sustainable way; and its example to be useful to other cities. This will require monitoring emissions; building municipal capacity and an effective network of stakeholders; active and decisive citizen participation based on a modal shift of social attitude; sustainable and inclusive economic development; and broad knowledge transfer. It is guided by a comprehensive vision of justice, listening and realistic optimism.

The technical core of the AP was coordinated by 5+1 scientific teams mobilizing national resources who, starting from an analysis of the existing emissions situation, looked into our main emission-producing areas and emission-reducing solutions (energy production, built environment, transportation, waste, and coastal/sea). Since all solution portfolios include overlapping digital aspects, a sixth team integrated them into an additional portfolio of 'smart' solutions. The scientific recommendations were presented publicly, discussed with stakeholders, and assessed by the political city and national leadership, resulting in a large number of implementing projects and a smaller number for enactment in the next 36 months.

Energy	**Built Environment**	**Transport/Mobility**
EA0: Change Electricity Mix EA1: PV Park Energy Community EA2: Fresnel System EA3: Residential RE storage EA4: Heat Pumps-residential EA5: RES long-term storage	BA1: Deep building renovation BA2: New carbon-neutral buildings BA3: Urban regeneration	TA1: Public transportation TA2: Micromobility TA3: Pedestrian Network TA4: Vehicle Electrification TA5: Freight transportation TA6: TDM Strategies TA7: Smart technologies
Coastal & the Port CA1: Cold Ironing & the port CA2: Marina energy community CA3 Risk assessment CA4: Coastal NZ neighborhood CA5: Seagrass Meadows CA6: Wave Energy	**Waste / Circular** WA1: Waste (organic) to energy WA2: Zero waste production (circular economy)	**Horizontal/digital** A1. Digital Transformation - Green IT A2. Urban Digital Platform A3. Smart Apps & Intelligent Modules and solutions A4. Limassol Digital Twin

Thematic Action Portfolios

	Project	Start	Months	(M€)	23	24a	24b	24c	24d	25a	25b	26
1	Co-W / LC	Feb-23	45	3								
2	Lc3	Jun-23	24	1.5								
3	Green jobs	Dec-23	36	1								
4	Social Innov	Jan-24	10	1								
5	Studies			3								
5.1	Cold Iron	Feb-24	10									
5.2	RE w. Storage	Mar-24	10									
5.3	Tram	Apr-24	10									
5.4	Build Retrof	May-24	10									
5.5	Cooling sea	May-24	10									
6	Lem NZ '30, Inc	Jun-24	30	1								
7	Regulations	Jun-24	18	0.5								
8	Local RE Storage	Jul-24	30	80								
9	Build Retrof	Sep-24	30	50								
10	Heat Island/Urban F	Oct-24	30	50								
11	mForests/Sea grass	Nov-24	27	20								
12	DigTwin	Dec-24	27	1								
13	Scale/Transfer	Jan-25	24	0.5								
14	EmissionMonitoring	Feb-25	20	1								
15	Financial Instr	Mar-25	15	0.5								
				214								

Current 3-year plan 2023-26

For implementation projects are selected based on their maturity; integration potential; scalability; social innovation and broad attractivity; cost/emissions reduction ratio; and intrinsic difficulty (for which a more lengthy and costly feasibility and technical study are required).

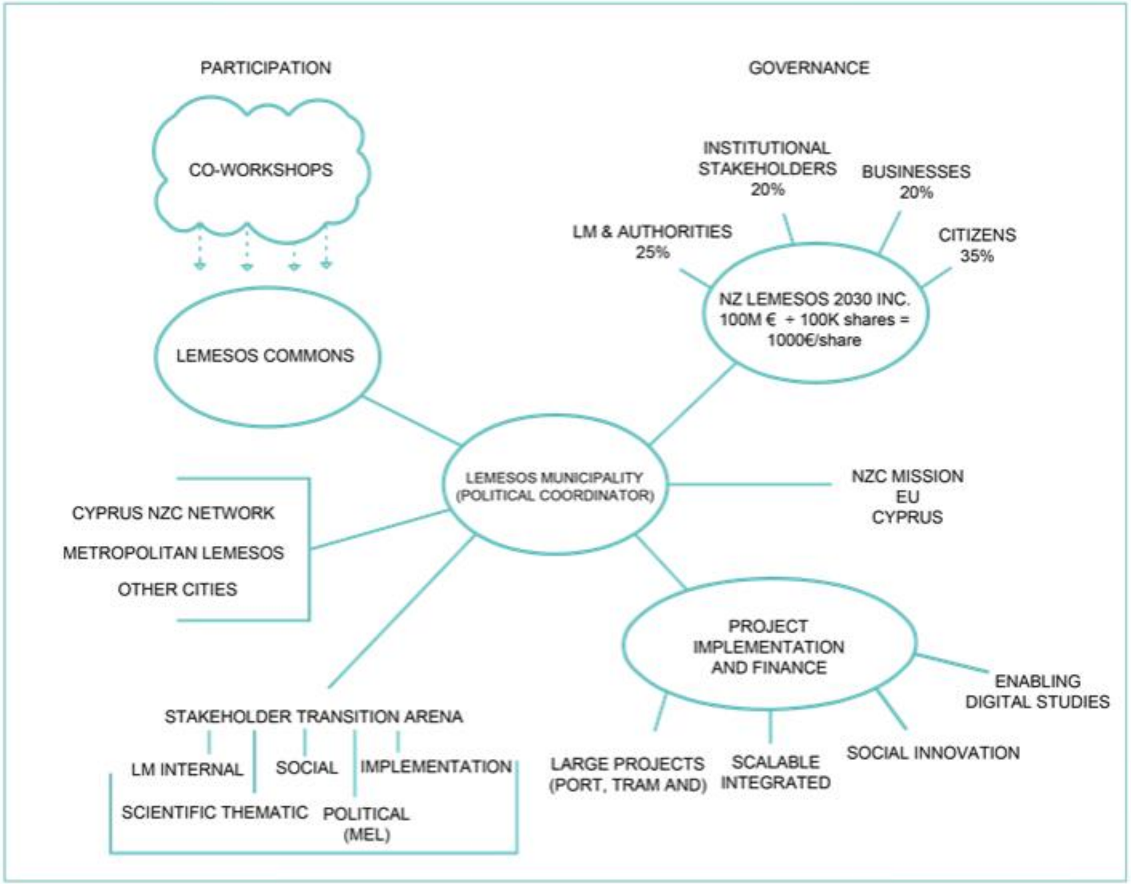
The graph shows the current 3-year plan 2023-26.

The political aspect of the AP is guided by three principles: keeping the stakeholders and especially citizens and SMEs positively engaged for the whole duration of the transition; maintain a positive economic development throughout for all, especially regarding jobs and small businesses; and balancing project timing for short-term versus long-term impact and visibility.

The deployment of the AP related to spatial, social and project selections. Spatially we start focusing on a central **low traffic speed zone of the city**, on the coastal zone, on the **carenaggio district** -a large, abandoned old repair yard area-, and **public open spaces and buildings**. Socially we start by focusing on **youth and elderly**, on the **educated** (both as allies and as possible adversaries), on the **well-to-do** (who produce most emissions) and the **marginalized** (who must not be left behind to be manipulated by climate deniers).

The main Stakeholders of the Transition are Citizens/Residents; Asset Owners; Professionals and Businesses; Financial institutions; Academia; local and national Authorities; and social influencers.

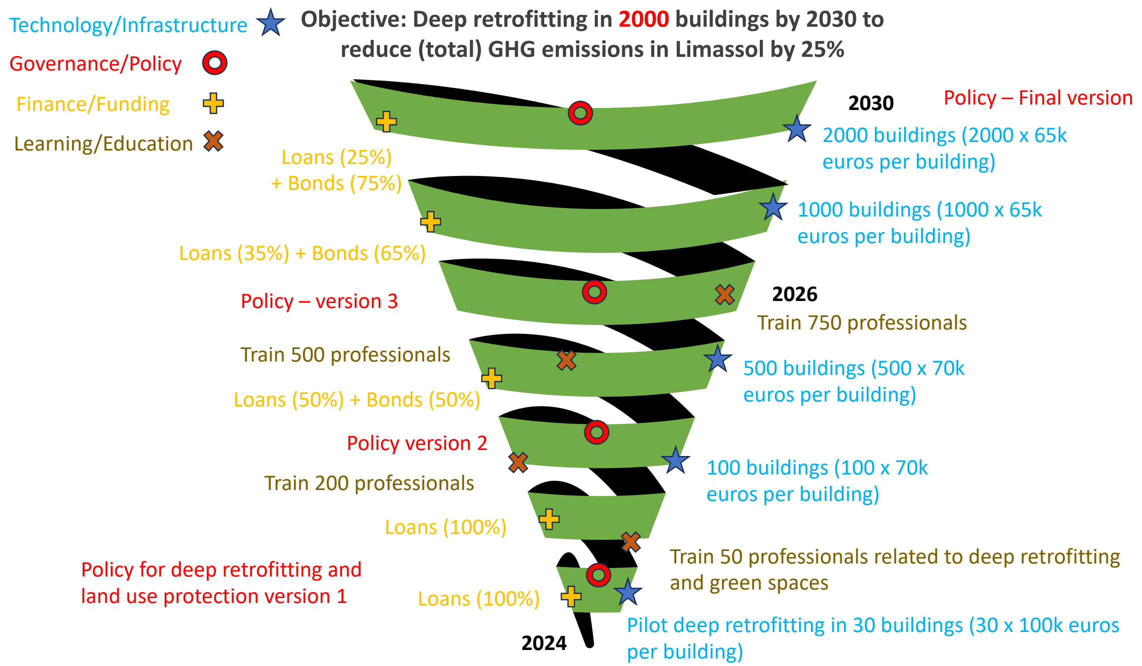
The governance and participation model is best depicted in the figure below.



Governance and participation model

The main social participation innovation is the Lemesos Commons, the central holistic advisory body of the Transition; it expresses the integrated view of stakeholders and citizens on solutions designed by co-workshops; it consists of 25 randomly selected co-workshop ‘graduates’ with a six-month tenure (see Introduction Section 3.4). The main governance innovation is NZ Lemesos 2030, Inc. the multi shareholder executive branch of the Transition; initially established by the L.M. it is a broad-base shareholder company with the L.M. and other authorities holding about 25% (none more than 10%), other institutional stakeholders about 20% (none more than 3%), individual business about 20% (none more than 2%) and individual citizens 35% (each up to .1%).

Many essential projects do not have direct emissions impact but are enabling projects: observations, modelling, and digital infrastructure; co-workshops, capacity building, communication, education and training for new green jobs and SMEs; feasibility and technical studies; and MEL. Also, most infrastructure projects (bicycle lanes, electrical buses) have little impact on emissions unless they are accompanied by a modal attitude and behavioral shift. This creates a precedence circle; our way out of it is to create an impact pathway "growing spiral":



The "growing spiral" impact pathway

Some barriers can only be taken into account, in that we cannot do much about them: Cyprus is an island (so, for example, its electric grid is not internationally interconnected) and a third of it is under Turkish military occupation (so that many resources, including the attention of the central government, are diverted to this); similarly the existing high building density and lack of open spaces of the city is a hard fact. For other significant barriers the City with the Stakeholders can act: its own capacity; social attitude towards the climate crisis and our ability and responsibioity to act; further construction; waste wasting; traffic congestion; and human resource development.

The main risks are the delay in completion of national climate plans especially regarding energy; faults in implementation timing can have cascading effects as well as public and stakeholder disillusionment; misaportioning of funding which can lead to many incomplete rather than fewer complete projects; and mid-term social opposition to the Transition especially if we miss the objective of new jobs and SMEs for those affected.

The opportunities, economic, cultural and social are great for a new Lemesos, a different concept of 'development', and a society that is not just 'international' but also inclusive. As the NZ vision of Lemesos city council states:

A real threat need not lead to forced labor. Our vision is not only a clean, healthy, green and quiet city, where we can go to all our jobs and entertainment on foot or by bike in less than twenty minutes, where children will safely walk or skate to school, where the little energy needed for proper temperature will be solar-generated, where private cars will be rare. Our vision is also to reach this transformation through a completely different process: discussing, co-designing solutions suitable for our needs and enjoying it.
[…]
Lemesos of zero emissions does not have citizens who hope and wish for climate neutrality but expect it from someone else without their own, personal participation. No one says: "this is none of my business". Lemesos of zero emissions has citizens with active participation, each in a minuscule part of this huge project but also with active enjoyment of the whole of a clean, open, healthy, progressive, inclusive, green city. No one "builds windows without enjoying the view."

This is our vision for Limassol. A beautiful, collective path to a regenerative goal. With the active participation of everybody in all stages.

List of figures

The list of figures **identifies the titles and locations** (page numbers) of **all visual elements:** figures, drawings, photos, maps, etc. used in the Action Plan.

List of tables

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Abbreviations and acronyms

The list of abbreviations and acronyms **identifies the abbreviations** (a shortened form of a word used in place of the full word) **and acronyms** (a word formed from the first letters of each of the words in a phrase of name) used in the Action Plan.

Abbreviations and acronyms	Definition
CCC	Climate City Contract
CoΛ	City of Λεμεσός
CyI	The Cyprus Institute
L.M.	Lemesos (Limassol) Municipality
LC^3	Lemesos City Cooling Challenge
KPI	Key Performance Indicator
MEL	Monitor, Evaluate, Learn
NBS	Nature-Based Solution(s)
NZC	Net Zero Cities
RE	Renewable Energy
Co-workshop	Participatory Co-design Solution Workshop

1 Introduction

The introduction should outline the local policy context in which the Action Plan is being developed and describe the gap it is addressing in broad terms.

Introduction - textual element

Acronyms, Special terms and Neologisms

CCC	Climate City Contract
CoΛ	City of Λεμεσός
CyI	The Cyprus Institute
L.M.	Lemesos (Limassol) Municipality
LC^3	Lemesos City Cooling Challenge
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RE	Renewable Energy
Co-workshop	Participatory Co-design Solution Workshop

Terminology:

Lemesos vs. Limassol	‘Λεμεσός’ is the name of the city in Greek which transliterates into ‘Lemesos’. ‘Limassol’ is the Latin name.
The Municipality of Lemesos	The legal entity, local government authority. It is planned that it will include a couple of adjacent municipalities in 2024, which are not included in the NZC Mission
The City of Lemesos	Ambiguous, may refer to the Municipality or the whole city.
Lemesos City	The geographic area, its people, built and natural environment, problems and opportunities, past, present, and future
Lemesos	Used in different ways by different people in different context to refer to the Municipality, the city, the metropolitan area, or the district. To be avoided here as a noun but used as an adjective.
Metropolitan Lemesos	Includes several municipalities around the City of Lemesos; to be integrated into 4 municipalities in 2024; several plans, such as the Integrated Lemesos Plan include the whole; not in the NZC as a whole, but most of the projects in the Transition are scalable and applicable to it
District of Lemesos	A broader area including many villages, coast, sea, mountainous, and rural regions. A part is occupied (‘rented’) to UK military bases.

Scope of this part of the AP

This document is intended as the first comprehensive non-technical introduction to the Lemesos "Climate City Contract" (CCC), which is the plan of L.M. and its partners for the Transition of the city to climate neutrality by 2030. Most of its content is included, verbatim or adapted, in the introductions of the Commitments document, the Action Plan and the Investment Plan.

It is intended for the Reviewers of the CCC (Mission, EU Commission, JRC, EIB), and along with its version in Greek for Lemesos City Council members and L.M. employees, for Transition partners and stakeholders, and the Citizens.

1.1 Objectives and Principles

1.1.1 Analysis

With its decision in January 2022 to express its interest in becoming one of the 100 NZC Mission Cities, the Lemesos Municipality (L.M.) declared that to maintain and enhance its position as a developed city it had to embrace change. Among others this means moving from fuel dependency (importing energy) to local resilience.

1.1.2 Central Objective

The Lemesos Municipality (L.M.) will lead the Lemesos Climate Transition (Transition), an effort by a broad spectrum of stakeholders (Section 1.2.2 below) with a dual result:

(a) That Lemesos City becomes climate neutral (net zero) by 31.12.2030 in an inclusive, and long-term sustainable way.
(b) That its example, including mistakes, will motivate other cities in Cyprus and the broader Eastern Med and Middle East towards similar objectives.

The Transition plan presented in this CCC does in fact meet the NZ goal as evidenced by the economic model analysis based on the Mission methodology and tool.

Systemic Objectives

While
0. Improving Lemesos energy production and consumption, built environment, transport, waste and coastal energy efficiency towards climate neutrality, also work to:
1. Tackle social attitude towards climate change.
2. Stakeholder involvement: Listen, co-design, educate, train, interact, disseminate.

3. Municipal capacity building, including augmented special regulatory frameworks.
4. Develop the economy inclusively attracting green investment and green jobs.
5. Monitor city emissions (Scope 1 & 2).
6. Exchange practices, form alliances, scale up, and transfer.

1.1.3 Principles

The inclusive vision of Lemesos Transition to NZ by 2030

Do not ignore social and political objections and reality.

Just transition: Jobs lost, SMEs out of business, those left behind.

“Do no harm” principle.

Listen, listen, listen!

1.2 Political Will, Overall Strategy, Priorities and Focus

1.2.1 Drawing the master meta-plan

After the submission of the application to the NZC Mission L.M. started a multi-prong approach:

- Communication: to Stakeholders and the Citizens. Planed:
- Scientific: the CyI and the thematic teams. Planed:
- Financial: internal savings and focus shift, the Cyprus Government, EU Commission, the private sector, application to the Pilot projects. Planed:
- Organizational: internal Transition team, scientific Transition team, Lemesos NZC 2020, EU affairs committee and EU affai rs office. Planed:
- Political: City priority, commitment of City, Vision, Ministries (Marine, Energy, Finance, …), CEA, Cyprus NZ Cities Network. Planed:

To achieve these objectives L.M. started communicating them to the stakeholders, drew up a **flexible open master meta-plan**, set up an internal Transition team from the Municipality and the Cyprus Institute (CyI), concluded a series of collaboration agreements leading to a de facto external Transition team, successfully applied for the pilot project LC^3 regarding emissions for cooling buildings, and collaboratively with the stakeholders drew the present CCC.

The basic tenets of the meta-plan are:

1. The main obstacle to climate transition is not a lack of technologies, but the capacity to implement them. The Municipality by itself and as is does not have the capacity (regulatory, organizational, human, knowhow) to reach a NZC by 2030. Policies are usually set at national level and cities have little flexibility.
2. In 2030, unless we take drastic measures (i.e. in the "business as usual" scenario) Lemesos will have grown, will be hotter, most of its buildings will be those existing now; energy consumption, traffic and waste will grow and worsen by a lot; sea and atmosphere will be much more polluted.
3. For pilot projects to scale up they must involve and have the support of all stakeholders, from the international economic elite owning assets in Lemesos, to professionals earning their living from the current situation, to 'average' citizens. (By 'citizens' we refer to all people living, working, visiting or passing by Lemesos.)
4. Although the CCC and the NCZ goal specifically refer to the geographic area of the City of Lemesos, the plan recognizes that the City is part of an integrated Metropolitan area. Emissions flow in and out of the City; most activities affect and are affected by the whole Metropolitan area.

So the master plan specifies that while reducing GHG emissions through "ground transformations", the Transition will also include:

1. Monitoring city emissions by modeling, observations, data gathering and digitization in order to assess and optimize the impact of our actions
2. Building Municipal capacity (for designing, selecting, funding, and promoting) needed to propose, design, lead, participate in, or implement such actions
3. Reforming the regulatory framework regarding (a) municipal competences and (b) improve energy, building, transport, waste and coastel regulations in order to enable the City to encourge -and enforce- the changes necessary for such actions
4. Educating, training, interacting and disseminating within the municipality, stakeholders including professional groups, and the public in order to obtain the human resources and support needed to sustain, scale and transfer our actions
5. Developing Smart green financial instruments and other investment opportunities towards the CoΛ (City of Λεμεσός) NZC goal by 2030 and replacing imported fossil fuels and other heavy transport dependent articles.
6. Forming Alliances with Cypriot stakeholders, with EU and EMME cities, with the scientific community, NGOs, private and public economic actors and the civil society in order to obtain the long-term support needed for sustainability and the know-how transfer of the Lemesos experience. L.M. has an open view towards collaboration with the Metropolitan area, and will share experiences, capacities and possible funding opportunities with a coalition of the willing.

1.2.2 From thematic areas of emissions to mitigation projects

Action Plan development methodology

The first analysis of the current situation was done based on thematic areas of emission production. In addition to the standard ones (Energy, Built Environment, Transportation, and Waste) it was important for Lemesos to add the Port and the Coastal area. This analysis initially undertaken by expert teams started with discussions with the relevant stakeholders in special workshops and then in co-design workshops with the City Council, the Municipality Administration, and the public. It resulted in about 30 broad mitigation Actions presented in the CCC template tables that follow; they will be implemented via several hundred projects such as the LC^3 mission pilot, installation of electric cars charging stations, park (trans)formations and other microclimate interventions, participatory stakeholder co-design workshops, training for new green jobs, a variety of social innovation projects, a series of building deep retrofitting projects, an organic waste treatment factory, minimize solid waste that goes to the landfill (household shortening, pay as you throw), green energy communities, land and sea carbon absorption NBS, and a tram line. (A concrete list of projects for 2023-26 is in Appendix I.) The thematic teams worked in weekly coordination meetings (to avoid silo mentality) along with a CCC coordination team by L.M. and the CyI with political supervision from the City Council, scientific from the Cy.I., and organizational from the L.M. Transition Team.

[1] The Port resembles an industrial operation, not only for the activities taking place on shore but also because moored ships use their diesel engines to produce electricity for their own use thus producing a lot of GHG emissions. The coastal area includes a narrow corridor of both land and sea and presents special opportunities, and challenges while sea breeze is a main factor defining the local Lemesos City microclimate.
[2] L.M. concluded collaboration agreements with the Cyprus Institute, Frederick University, the University of Cyprus and the Cyprus University of Technology to lead six thematic teams. It also commissioned the Cyprus Energy Office to assist with the emissions baseline update and Deloite Limassol to assist with the investment plan

Structure

We thus have four levels of detail for the Action Plan (see Table below):
- The whole Transition
- The six Thematic Areas
- The 5-7 Actions of each area and
- The hundreds of implementation projects

Lemesos NZC Transition: Six Thematic Areas, 30 (broad) Actions, examples hundreeds of implementation projects (Appendix I)

Energy	**Built Environment**	**Transport/Mobility**
EA0: Energy mix change EA1: PV park & Energy communities EA2: Frenel solar to heat EA3: Residential RE w. storage EA4: Heat pumps EA5: RE w. storage	BA1: Deep building renovation BA2: New carbon-neutral buildings BA3: Urban regeneration	TA 1. public transportation TA 2. micro-mobility TA 3. pedestrian network TA 4. vehicle electrification TA 5. freight transportation TA 6. transportation demand management TA 7. smart technologies
Coastal & the Port	**Waste / Cyclic**	**Digital**
CA1: Cold Iron & the Port CA2: Marina energy community CA3: Risk mitigation CA4: Resilient Coastal Neighbourhoods CA5: Seagrass Meadows CA6: Wave Energy	WA1: Proper collection and triage WA2: Biofuel WA3: No landfills	DA1. Digital Transformation - Green IT DA2. Urban Digital Platform DA3. Smart Apps & Intelligent Modules DA4. Limassol Digital Twin

To translate Actions into prioritized implementation Projects we used the guiding principles (Section 1.2.3), focus areas (Section 1.2.4) and project selection criteria (Section 1.4.1). Most projects and many actions benefit from the expertise and considerations of more than one thematic area.

For the first two years we expect to issue a new edition of the CCC every six months.

1.2.3 Guiding principles for project priorities

The **first guiding principle** for the Lemesos Transition priorities is to **keep the stakeholders and especially the public positively engaged**. Climate change mitigation and adaptation plans typically face mid-term strong social opposition; political changes often upend implementation (the Trump administration withdrawal from the Paris Agreement and the recent change in the City Administration of Sevilla are prime examples.) Involving people and organizations in the decisions and the implementation -even when the result is not the theoretically optimal- ensures completion and impact more than anything else.
To cultivate a positive social attitude towards climate change and active involvement in the Transition we include the following, which are included -at the appropriate scale- in all projects, actions, thematic areas, and the whole Transition:

Thus, the **second guiding principle** for the success of Lemesos Transition is to **keep a positive economic balance for individuals, for businesses especially SMEs, and overall**. We will ensure that during the whole Transition period not only is the overall job balance positive (i.e., more green jobs exist providing higher reward, productivity, quality, local added-value) but also (a) on a personal basis no one loses their job without multiple opportunities to get trained for and obtain a suitable and better one; and (b) no SME goes out of business without multiple opportunities to establish a suitable and better one. This is achieved through (a) the fact that projects stem from co-workshops with the stakeholders (b) detailed discussions in Lemesos Commons (c) the requirement for each project in addition to the environmental impact study to have an economic and social impact study. These will be preemptive activities agreed in detail beforehand.

Example: Activity 4 of the Transportation Thematic, namely Transport Demand Optimization will lead to a large reduction of in-city freight transport by trucks and thus a reduction of work for truck drivers who often own their vehicle thus functioning as a small business. (In a municipal meeting they already expressed their opposition to this Activity raising the specific concern.) Since Activity 1 of Transportation will lead to increase of public transportation, they can be offered the opportunity along with suitable financing and training to exchange their truck for a (percentage of a) bus and work as bus drivers. Similarly bus drivers will be offered jobs on the tram line along with suitable training.

Third guiding principle for the Lemesos Transition priorities is **balanced timing**: It is important to balance and combine short- and long-term actions with respect to visibility, implementation, and impact, even when they do not have an immediate climate impact or when this timing is not economically or climatically optimal.
Examples:
- Electric buses (and cars) are visible and relatively easy to introduce; charging them with RE is invisible to the public and very complex (depends on the grid energy mix). Although introducing new electric buses before ensuring RE for them is not climatically optimal, it might make sense to do it for visibility and promotion of public transportation.

- A tram line takes a very long time to construct, a large part of it is invisible (planning, commissioning, financing), another large part is upsetting to the city life; however, has a huge long-term impact -but mainly after 2030. This is the reverse case, where impact trumps visibility.

1.3 Lemesos: Data, Focus, and Stakeholders

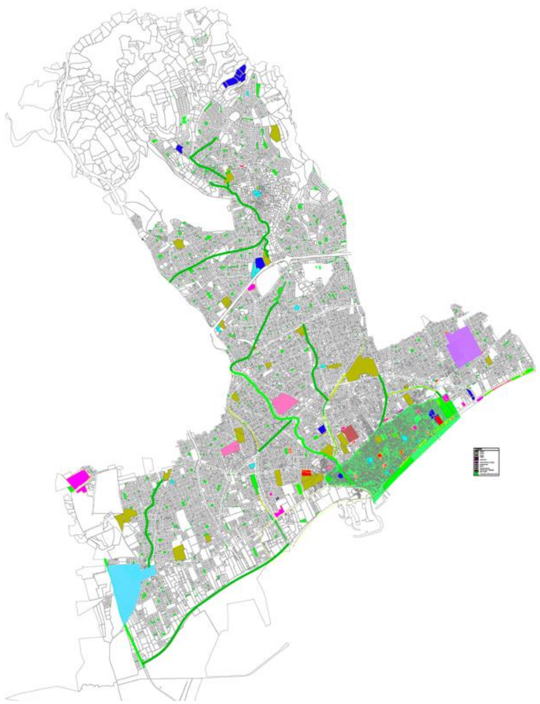
1.3.1 Lemesos Fundamentals

Lemesos is the second largest urban area in Cyprus after the capital, Lefcosia, with an urban population of 189600 and a metropolitan population of 248300 (CyStat 2019).
It is a fast-growing city which has developed rapidly especially within the last 10-15 years, development which resulted in a construction boom fuelled both by the tourist sector, as well as high and increasing foreign investments. It is a city on the East Med and Middle East, so it is particularly vulnerable to climate change with temperatures soaring the last years and the predictions for the years to come rather dire.
Lemesos port is the major seaport of Cyprus and therefore Lemesos is an important trade centre for the country, subsequently making the city the home of many offshore and shipping companies and thus greatly contributing to the economy of the country.
The City of Lemesos is a large fraction of the city, of 101000 inhabitants. The people who may be considered as part of this geographic area are far from homogeneous, in origin and activities. There are people who may live, work, visit, study, or just own property in the city, e.g., someone may work or study but not live in the city. Lemesos traditionally has had, except for the Greek, Turkish and Armenian communities. In the more recent years many Russians, Ukrainians, Israelis, Germans, Serbs, and others have moved to Lemesos, or spend significant amount of time there for business, vacation or just a second home. All these groups produce emissions with their activities in the city.
In terms of transportation, although Limassol is served by buses, public transportation is in generally not widely used and the percentage of usage now stands at 3% although the current goal set in 2018 was 10%.
Most of the energy consumed within the municipality limits is on buildings, especially cooling, and transport.

1.3.2 Geographic and Social Focus

For the next three years Transition projects will non-exclusively focus on certain geographic areas, certain social groups, and certain types of projects, as described below and in 1.4.1.

Geographic and spatial (see map): It makes technical, economic, social and communication sense to focus on certain geographic areas for the 2023-2026 planning period. The following parts of the city are currently undergoing significant changes, and as systems that are already in transition provide the opportunity to be further modified and exploited for Lemesos Transition plan. Interventions will focus on the following areas, which will be non-exclusively utilized:



The City of Lemesos: The 30Km zone (green), the coastal zone, the port (bottom left), the carenaggio district, and several public buildings and open spaces.

1. The reduced traffic “30km/h” zone: the old city center (green on the map) is diverse and indicative of the shole city. It includes several public buildings, a marginalized neighbourhood, modern business office buildings, schools, churches, the central bus station and other characteristics making it ideal for integrated pilot projects (‘Missionlets’ below). This socially diverse zone has been decided by the City Council and will shortly become a 30 km/h maximum speed zone and it is a prime location where many pilot projects will be implemented, as it already is undergoing changes.

2. The coastal zone (tram line and the port): crucial for city life, central for local and foreign visitors, suitable showcase for all taking place there, it is the location for three very large, non-scalable but transferable projects: cold ironing of moored freight vessels (see Coastal Action 1), sea-based seagrass NBS (Coastal Action 4) and the Tram line (see Transportation Action 1).

3. The carenaggio district (Καρνάγιο– the old boat repair yard) A large, 1-Km abandoned, largely empty area where new innovative interventions will be developed. Old industrial area including large abandoned old buildings and boats; between the old and the new port areas.

4. Public spaces and public buildings: they present a broad spectrum of opportunities for emissions reduction, high visibility, social consensus, important co-benefits for citizens, surmountable though tricky regulatory issues, and funding opportunities. Public open spaces are crucial for the local microclimate especially for lowering ambient temperature and NBS (micro-forests).

Social: Involving all stakeholders and citizens is crucial throughout the Transition. However certain groups require special attention either as opportunity (the young for example) or as part of the just aspect of the Transition. Projects that target these groups and projects that they have selected (see planned project number 4 Social innovation: “Let 100 flowers bloom”) will be given priority.

The priority social groups we consider and include in our stakeholders are:

1. The young and the old (defined as those outside main social production; combining in a single group: the long-term ‘dreamers’ with the long-experience Blessed ones who want to plant trees under whose shade they will never sit, ensures the best forward-looking leverage of existing knowledge and skills for wise risk taking)
2. The educated (those ready to be convinced by and propose rational and scientific arguments)
3. The well-to-do (those producing the most emissions)
4. The pushed-away and left-behind (those who must benefit most from the Transition; vulnerable: affected by change, through various reasons unable to adapt without support)

These groups are potentially strong allies in the Transition effort; we do expect however significant minorities of them to oppose climate mitigation activities which is why our social innovation projects will pay special attention to them.

1.3.3 Stakeholders

Some stakeholders are authorities such as the Department of Energy or the Port Authority; their representation in the Transition is clearly resolved by the Authority hierarchy. Other stakeholders, however, are a group of people, such as the architects, the taxi drivers, or the apartment owners, who may or may not have an association or several, which may or may not actually represent them especially for issues related to the Transition. In this case we consider the group of people as the Stakeholder and their participation in the Transition is an issue to be resolved, often differently in different contexts.

'Citizens': Not 'citizens' in the legal sense, but all people who live, work, pass by, visit, own assets and in general have emissions-producing activities in Lemesos. Community (organized civil society, online influencers, and ad hoc local citizens). Residents in the city (for work and for living) and visitors (clients and tourists). They may be working in the target are and live elsewhere (including in other cities in Cyprus) or vice-versa. They represent "society-at-large". Civil society: NGO's and concerned citizens. Civil society, from environmental groups to political parties. We expect that being concerned citizens they already realize the risk of the Climate Crisis, but not necessarily in a scientifically correct way, neither have a realistic view of possible interventions.
➔ Co-design and co-create the pilot activities (field and communication interventions aiming at attitude and behaviour changes)

Asset Owners: of buildings, public spaces, enterprises, the port, open spaces they constitute a special-interest group. The interventions will in general require their consent and since they might discomfort them, convincing them will be paramount.
➔ Agree, co-design solutions, and allow implementation of the interventions in their properties. Post-intervention positive communal informal influencers. Ensure or acquire regulatory competence for interventions.

Professionals and Businesses (from construction, transportation, tourism, port, commerce, media, education and other services) and professional associations. Catalysts for the whole Mission as major city economic forces, co-designers of the interventions who will be called to apply them, they will need diversifying new skills. Professional opinion leaders, such as journalists and teachers.
➔ Co-design and implement the interventions; provide education and training.

Financial institutions:
➔ Design and enable appropriate financial instruments.

Private businesses: They affect emissions a lot and are affected by the Transition very much. The can play a very positive role as investors and drivers of climate resilience actions or they can play a very negative role resisting the necessary changes. Including them, listening to them

Academia: Scientists/Researchers and Higher education and research institutions. Scientists in all aspects of climate science, energy, architecture, city planning etc as well as fields affected by climate change such as health and marine. They are expected to provide a broad spectrum of solutions, not always specific, practical, or economic.
➔ Lead the scientific (technological and socio-psychological) aspects of the project innovation; monitor impact, including carbon footprint and attitude/behavior changes.

Authorities: Government and municipal agencies; **Central Government agencies (e.g. Energy Dept)**: organizations and employees. We expect them to understand regulatory and procedural impediments and help overcome them.
So far we already see the very strong commitment of the mayor and the ity council, the incorporation of the Lemesos CCC in the new Republic of Cyprus plan for Energy and Climate, the Port Authority adopting the proposed cold ironing and climate friendliness of the Port, and the stakeholders engaged to create the related actions. The public statement of the president of Cyprus that supports the mission, and the high visibility role of the mission in events, forums and public meetings.
➔ Allow the necessary experimentation at city level. Transfer the Lemesos experience to the whole country. Assist in necessary regulatory changes.

All stakeholders will participate in homogeneous co-design workshops (participants from the same stakeholder group) to get to a common understanding of the problems, reasons thereof, obstacles, and possible solutions to select based on participatory budgeting exercises and design at the detail possible given time constraints and the fact that each group has understanding of only one aspect.

To tie all workshops together and obtain a more spherical view of the problems, potential acceptable solutions a heterogenous co-workshop will be set up (see "Lemesos Commons" at the Governance section) in which participants from all aspects of the problem will discuss and codesign solutions. To include as many stakeholders as possible, and get a better overview of their opinions, the stakeholders of these workshops will be rotated.

Convincing stakeholders to participate will be a significant communication exercise, especially since we do NOT want only those who already agree and will be happy to participate. The views of the people who disagree and will be inconvenienced by the actions towards climate neutrality are particularly important and need to be considered in order to find solutions to their opposition and move towards a smooth and just transition.
Diversity and randomness of co-workshop participants greatly helps scalability as they will be used for reflexive learning: we expect to meet in the pilot most of the problems to be faced in the large scale.

1.3.4 Co-workshops and the Lemesos Commons

Active and impactful involvement of the Stakeholders and the Public.

(In our view the Public ('Citizens') are a stakeholder and there is no need for differentiation, but from Mission documents it seems that by "Stakeholders" often organizations are meant (e.g. we consider Architects to be Stakeholders; it seems that the Mission considers the Architect's Association as the Stakeholder; this is not hair-splitting semantics, it has to do with natural vs. legal persons, but this is not the place to discuss it.) So, we refer to "Stakeholders and Citizens" or "Stakeholders and the Public".)

Despite the general agreement about informing and involving all stakeholders and citizens in City Climate Transitions, specific methods, objectives and therefore results differ. The Lemesos Transition master plan includes two main instruments: **Co-workshops** and the **Lemesos Commons**. Their main objectives are (a) to achieve a shift in social attitude towards people becoming agents of change in the climate crisis (Appendix **III**) and (b) distilling collective wisdom for the Transition. This wisdom will materialize in the form of transition-advancing detailed project proposals that are well thought-out, consider multiple stakeholder concerns, are solidly grounded on science, can be socially monitored, have broad support, and deal positively and objectively with objections.

Co-workshops: Participatory co-design solution workshops

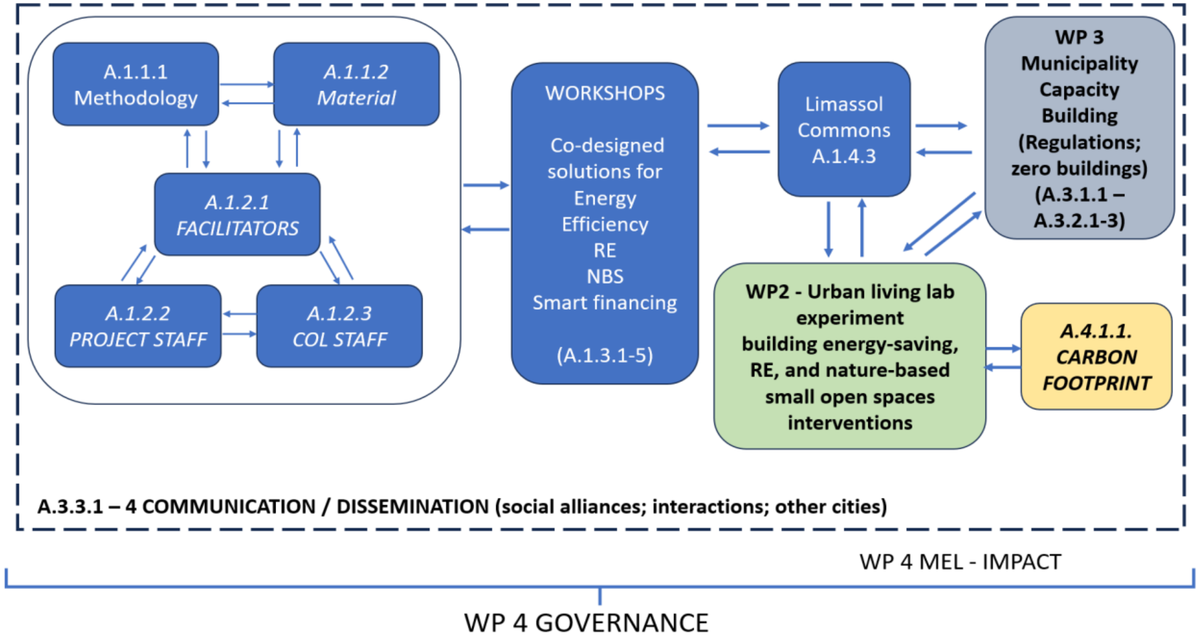
Co-workshop methodology (protocol) has been developed in the pilot project LC^3. A co-workshop is a transition-long effort by a team of 15-20 people from a single group of stakeholders (Section 1.3.3) and is in this respect only homogeneous. It is organized around one or more face-to-face 3-hour sessions and includes initial group selection and preparation, subsequent synchronous and asynchronous online communication, and long-term team building. It is guided by a Transition-trained facilitator whose role is to organize, listen, conduct the face-to-face sessions, monitor the progress, evaluate the outcome, and transfer the learning to the whole Transition arena. Each workshop has a central theme, a specific issue for consideration and solution design. The sessions are interactive with well-designed activities and a self-reflection ending in each. Experts may join parts of the physical or online interaction, especially at the beginning and for answering feasibility questions and transferring experience from beyond Lemesos. The evolving concrete outcome of co-workshops is their co-designed solutions developed. The main expected impact is the change of attitude of the participants towards Climate Change, the Municipality and their personal and collective capacity to become change agents. Both outcome and impact of co-workshops are open (may change) and long-term. Is it expected that co-workshop participation will evolve in time with some new members joining and old leaving.

The Lemesos Commons: **from solutions to projects**

Around 20 experienced co-workshop participants, randomly selected from various stakeholder co-workshops, will form a heterogeneous stakeholder group, the Lemesos Commons, to review, harmonize, and integrate solutions developed from the homogeneous co-workshops. (Analyzing a problem first from one point of view by a homogeneous group and then from several points of view by a regrouped heterogeneous team is the well-known jigsaw method.) The reason for random selection is representativeness. Lemesos Commons members will commit their time for six months and then be replaced by other, also randomly selected, members from the same stakeholder group. (Each month $1/6^{th}$ of Lemesos Commons members will be changed so that the change in membership is gradual.) The methodology for initial Lemesos Commons member preparation, physical sessions, synchronous and asynchronous online communication, progress monitoring, outcome evaluation, and transferring learning to the whole Transition arena is similar to those of the Co-workshops. An experienced member will act as the Lemesos Commons 'Speaker' for 6 months, representing the Commons to the Transition team, the City Council, and the broader society. The outcome of the Lemesos Commons will be transition-advancing detailed project proposals that are well thought-out, consider multiple stakeholder concerns, are based on scientific expertise, can be socially monitored, have broad support and deal positively with objections. Its authority stems from its members' social recognition, their institutionalized participation in the governance/monitoring of Transition projects, participation in the City Transition team and the Lemesos NZC 2030 organization advisory board, but mainly it is their expert and referent authority that is important, so that although they have no formal veto power, their collective opinions will be respected.

Civic engagement: participation and challenges

Civic engagement is perhaps the major Transition action. Citizens are the main stakeholder and will be represented by random co-workshop "graduates" living/working in Lemesos, as economic actors (asset owners and users, professionals affected by or effecting the interventions), scientists and academics and political entities (government agencies and civil society). Co-design involves user engagement methods focused on collecting information from and empowering citizens to form a better understanding of their needs, through storytelling, workshops, and interactive design tools. The figure below (from LC^3) presents the approach that to establish the "Limassol Commons" towards the implementation of pilot projects, their upscaling process and MEL. All this work will be accompanied by dissemination at several levels (local, national, international) and MEL.



Establishing "Lemesos Commnons"

There are three challenges related to citizen engagement. First is getting a representative, fair, inclusive distribution of citizen groups to participate in the workshops in physical presence (not online); for the successful implementation of this, a thorough stakeholder mapping process has been conducted. Second is conducting the workshops so that they are actually participative co-design and not "presentation - questions - vote". Third is keeping citizens engaged afterwards, in the Lemesos Commons and the interventions. The difficulty (and the pitfall) is not to select those already interested, active and concerned by the Climate Crisis, else whatever success the Transition may initially have will not be scalable.

Details matter a lot: preparing the methodology and materials for the co-workshops; selecting and training the workshop facilitators (including issues on climate and psychology); running an effective CoΛ campaign inviting citizens; dealing with climate deniers, political opponents of the city administration, narrow-minded interests etc.; utilizing the presence of journalists and educators; and keeping people actively engaged for a long period. But, if we do manage these, the collective narrative will actually be owned by the citizens of Lemesos.

It is important to show that political decision-making can improve the life of all in the long run, even if this would mean small sacrifice on the short term. This is based on trust building with the public.

1.4 Implementation: Method, Projects, Synchronization, Work Progress, Timeline

1.4.1 Governance and Participation

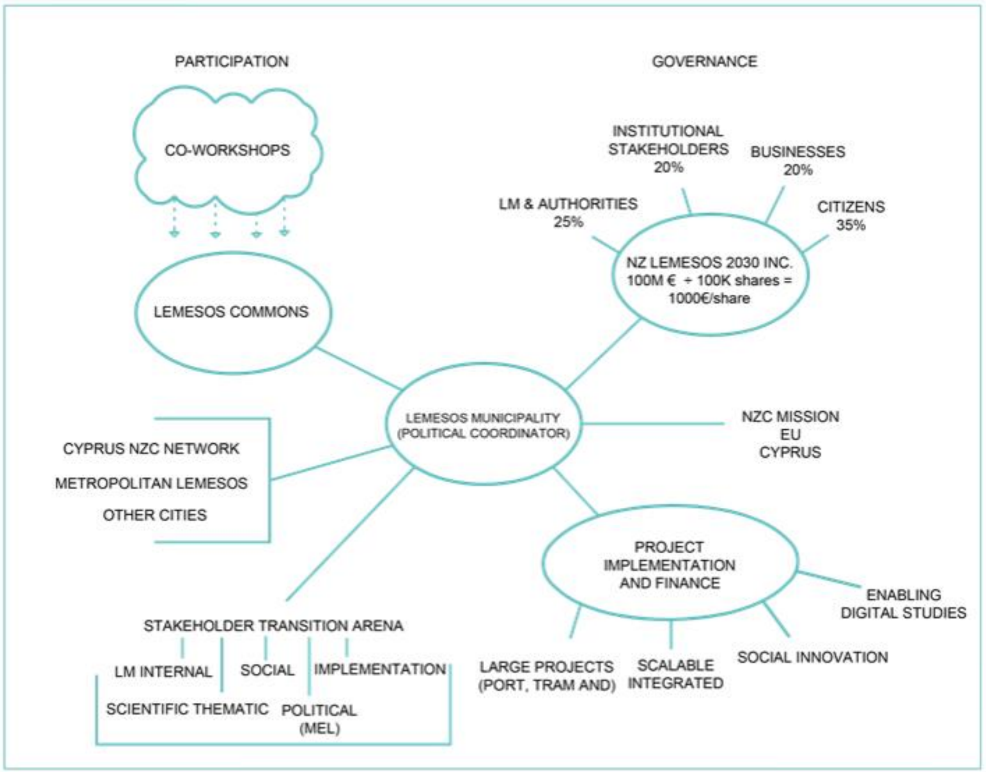
Although Governance and Participation are not the same, in our Transition Model they are closely interrelated.

Transition governance interventions relate to three fundamental aspects: 1) socially just transition for all, 2) sound science and technology and 3) effective and transparent execution. The “NZ Lemesos 2030, Inc.” organization is the executive branch of the Transition, initially established by L.M. as a multi-shareholder company. L.M. politically coordinates participation instruments (co-workshops, the Lemesos Commons, the five transitions teams and the Cyprus NZ City Network) with governance instruments (NZ Lemesos 2030, Inc., EU Mission, the Cyprus Republic central government and particular authorities, and project implentation and finance.

1) **NZ LEMESOS 2030, Inc** is a broad-base shareholder company with Lemesos Municipality and other governmental authorities holding about 25% (none more than 10%), other institutional stakeholders about 20% (none more than 3%), individual businesses about 20% (none more than 2%) and individual citizens 35% (each up to 0.1%). As a private-law public-interest company has flexibility and can accelerate project detailed design, initiation and execution (in comparison to the municipality current capacity). All views have been considered at the planning stage to avoid major obstacles. Barrier identification and dealing with opposition are key challenges to the Transition. 1) NZ Lemesos 2030, Inc increases transparency related to human and financial resources incorporation to the Transision. Equaly important, the organization dumpens the effect of political change at the Municipality and the Central Government level.
2) **The co-workshops and the Lemesos Commons.** Stakeholders and citizens engagement for co-design and co-implementation is fundamental. The Lemesos Climate Transition plan involves active stakeholder and public engagement through the Lemesos Commons. Co-workshops gather homogeneous groups to address climate issues, aiming to change attitudes. The Commons, comprising diverse participants, harmonizes solutions and proposes projects. The outcome of the Lemesos Commons will be transition-advancing detailed project proposals that are well thought-out, consider multiple stakeholder concerns, are based on scientific expertise, can be socially monitored, have broad support and deal positively with objections. These enable NZ LEMESOS 2030 to fulfill its role.
3) **The stakeholders Transition Arena** constista of five transition teams:
    - the municipality (internal) transition team
    - the scientific (Thematic groups) transition team
    - the social groups transition team (including foreigners and migrants)
    - the political transition team (mayor and ex-mayor, local current and ex-members of the Cyprus Parliament, political parties, the media)

- the implementation transition team (stakeholders, mainly businesses and financial institutions, who will be deeply involved in the Transition implementation)

The Arena, among others, creates strong social (and therefore political) support for controversial decisions and thus, helps in correct sequencing and timing of key projects and their upscaling (e.g., deep retrofiting, tram). In addition, the Arena could help in attracting human and financial resources.



Governance and participation in the transition model

The difference between 2 and 3 is that the Lemesos Commons (2) is more inclusive (random membership - no one left behind principle) while the Arena (3) is more selective (e.g., key scientists, institutions, and citizens). Both are needed: an individual truck driver can, by her participation in co-workshop and L. Commons have her view considered while a transportation professor can, by her participation in the Scientific transition Team and the stakeholder arena have her view considered. While not mutually exclusive, they will tend to attract different people and different discussions will take place in each. The municipality will add the political coordination and advance them to NZC Lemesos 2030, Inc. for execution.

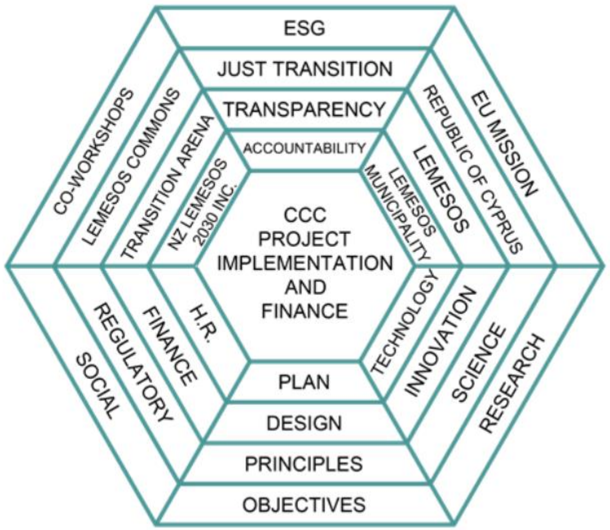
Moreover, even though stakeholders and citizens are involved as shareholders in the NCZ 2030 Inc., they are needed in the Arena and the Commons: (a) NZC Lemesos 2030, Inc. is *executive*, it must act efficiently and effectively, rather than deliberate. The Arena and the Commons on the other hand are spaces for discussion, solution co-design, where bold proposals can be made without fear of risk. (b) NZC Lemesos 2030, Inc. may be economically just -within the capitalist system-, but is not socially just. (Not every family can afford a share in NZC Lemesos 2030, Inc and not every SME is willing to invest.) So, we have three qualitatively different pillars for the Transition: Commons (socially broad), Arena (expertise focused) and NZC Lemesos 2030, Inc (business-savy).

4) The participation of L.M. in the EU NZC Mission, in the Network of Greek Mission Cities and the Cyprus Network of NZ Cities facilitates knowledge, skill and good practice transfer among cities. Scalability and transferability in both directions and stronger leverage towards central governments, the Mission and the EU. It leverasges collective wisdom for a global problem and allows activities to be assessed on their social, economic and climate merits.

5) These participation and governance innovations, briefly presented here facilitate the implemenation, upscaling and MEL in the hundrends of Transitions projects ensuring that they all are effeective, well-thought, transparent, and inclusive.

6) The broad shareholder basis of NZ Lemesos 2030 Inc and the continuous gradual random replacement of Lemesos Commons representatives (1/6th every month for a 6-month term) ensure smooth implementation change against political changes.

These governance interventions cover six main aspects of the Lemesos Transition depicted below.



The six main aspects of the Lemesos Transition

1.4.2 Selection criteria for project implementation

Maturity: Regulatory, feasibility, environmental, technical, detailed implementation studies; financing; human and technical resources

Integration: "Missionlets" – Integrated pilot projects (systemic, integrating proposals from more than one thematic spatially focused, suitable for demo)

Scalability: "Fireworks" – Scalable projects (easily repeatable with small changes in larger sizes)

Broad attractivity: "Let 100 flowers bloom" – Small social innovation projects supported by organized groups of citizens and small stakeholders

Cost/performance: "Economizers": Projects with good cost/performance (i.e. smallest cost per CO_2 ton equivalent)

Long duration, high risk, extra difficult: "Toughies" – Deep building retrofitting at a sustainable rate (ensure supply chains and local human resources) and the tram coastal line. For such projects a long and

1.4.3 Three-year Plan (2023-2026)

For the 36 months starting October 15, 2023 the following projects are planned (see Annex I for budget, time, and as descriptions):

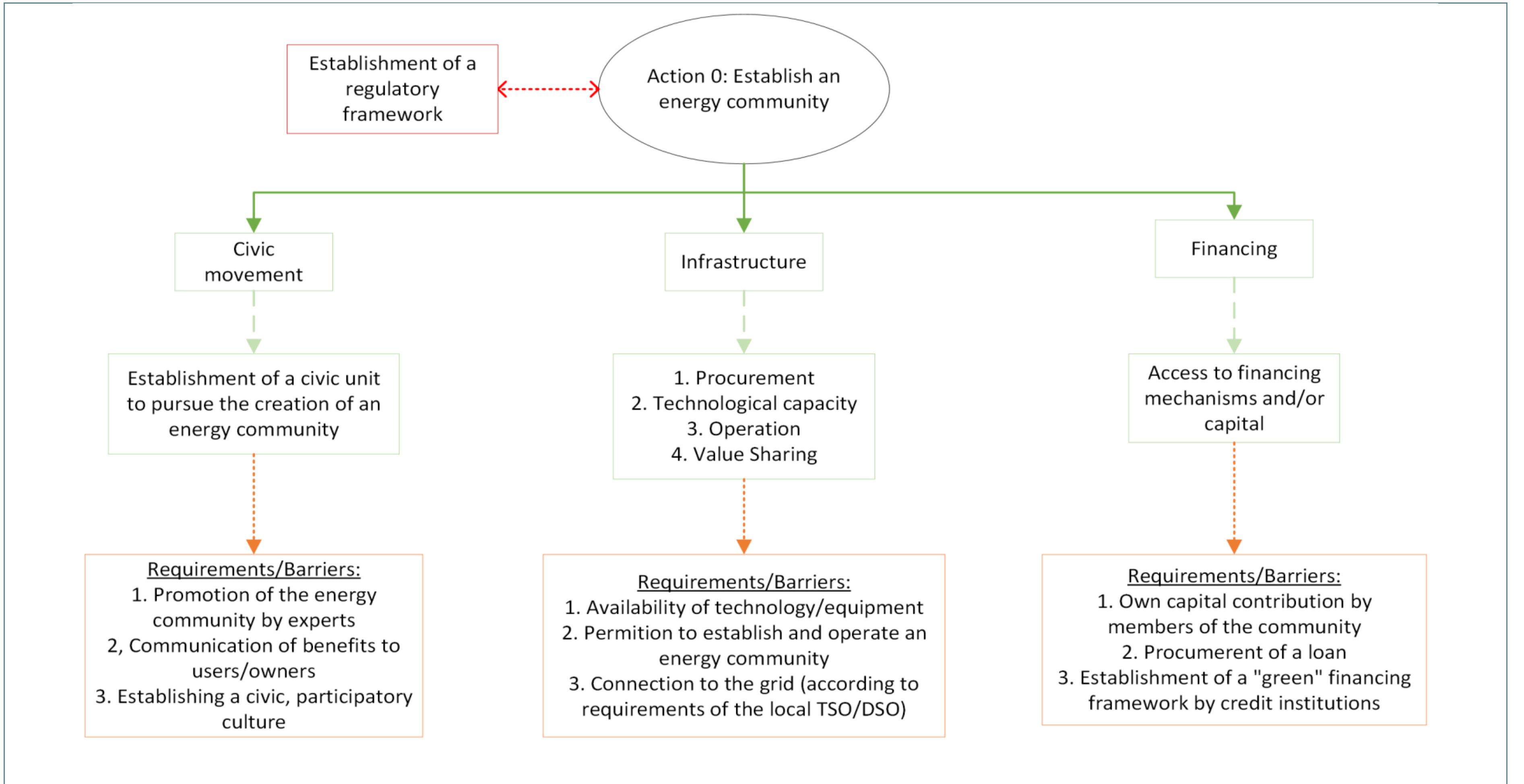
1. Citizens and Stakeholder engagement through Co-workshops and the Lemesos Commons
2. The pilot Lemesos City Cooling Challenge Lc3
3. Green Jobs
4. Social innovation: "Let 100 flowers bloom." by organizations as their social corporate responsibility; universities; schools; NGOs and concerned active citizens; may be result of co-workshops
5. Maturation of tough projects includes feasibility, planning including and investment for:
   5.1 Moored vessels cold ironing
   5.2 Tram line (coastal) Large scale building retrofitting (Stage 3)
   5.3 Large scale RE storage and consumption
   5.4 Sea as a carbon sink: Posidonia Oceanica
   5.5 Non-solar local RES production
   5.6 Building cooling by sea water
6. "Lemesos NZC 2030" organization
7. Regulations and Regulatory sandbox (Buildings, Transport, Energy Communities)
8. Local, small scale RE production

9. Local, small scale and focused RE storage and consumption
10. City-wide Building deep retrofitting Stages 2 and 3
11. Reducing City Heat Island effect through open space utilization and smart interventions Stages 2 and 3
12. City micro-forests - NBS
13. Digital Twin and related (public, open) city for-climate repository
14. Smart green financial instruments
15. Emissions monitoring
16. Scale and Transfer: Greater Lemesos; Cyprus NZC network

[Timing, budget, and short project descriptions in Annex I]

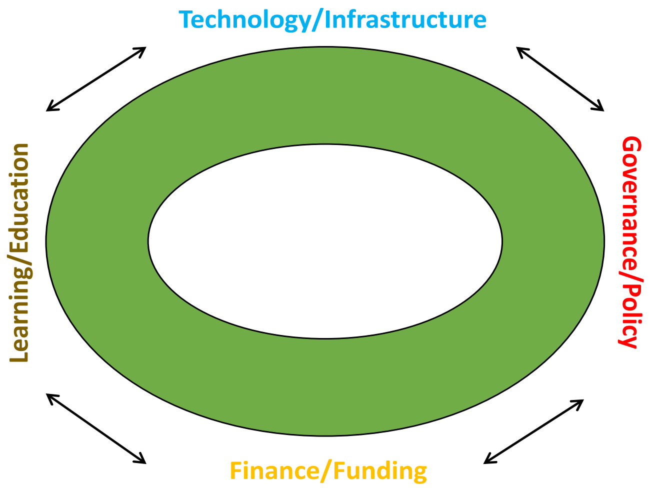
1.4.4 Intervention interdependencies and The Growing Spiral

The 30 actions included in the present Action Plan as designed by the Thematic Teams after the co-workshops with stakeholders and citizens are rather large and comprehensive. For their implementation several hundred sub-actions (or activities) and projects will be required. The figure below presents a first-level interdependency analysis of Action 3 (Energy Communities) by the Energy thematic team. Relevant projects are included in the 2023-26 plan under projects 8 and 9 (Local, small scale RE production, and focused RE storage and consumption) and under the Coastal thematic Action 2 (the Marina Energy Community).



Sub-actions (activities) dependencies for Establishing Energy Communities

Deep retrofitting in buildings (design methodologies, construction practices, monitoring and evaluation procedures on specified buildings in representative neighborhoods to achieve the Zero Emission City Target. And establishing a learning process.)



Co-workshops / training / education (build environment; deep renovations)

MEL

Incentive schemes (for promoting deep renovations)

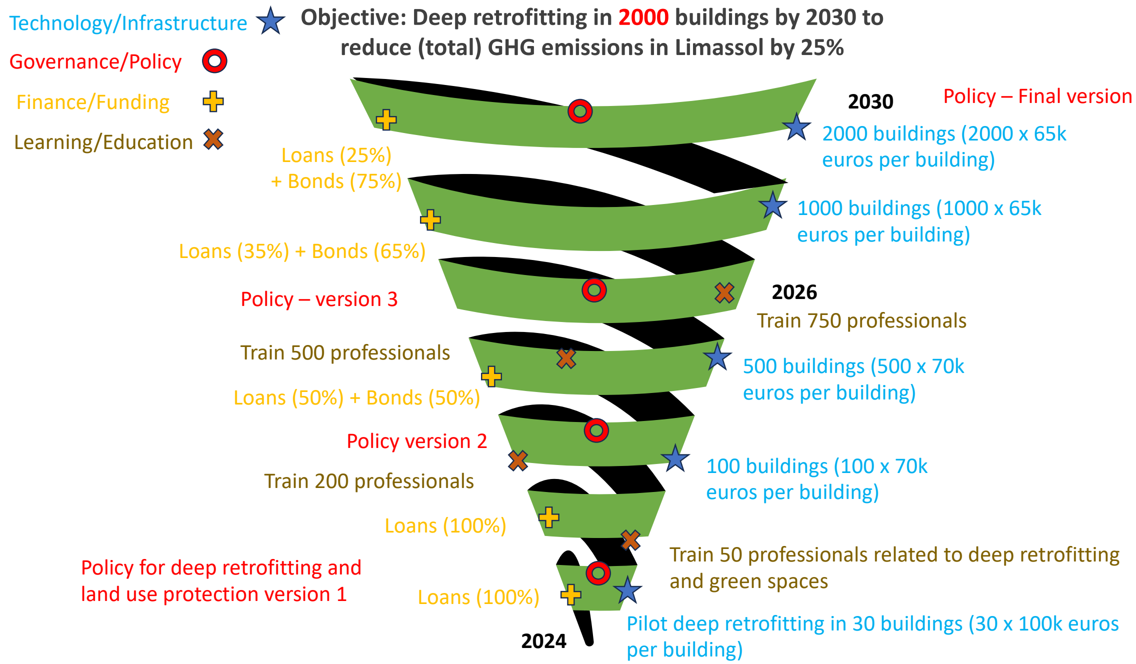
Update of building policies for NZC (energy performance standards, building codes…).

Land use protection: A policy framework (micro-forestation, green spaces and trees in urban areas).

Targeted financial mechanisms (mobilize funds for deep renovations; e.g., loans, bonds, investment funds)

Interdependencies: where to start from?

As co-workshops develop solutions starting from the initial proposals by experts and municipality, and the Lemesos Commons reviews them from all stakeholders points of view, timing for building infrastructure, establishing the relevant policies, attracting the necessary finance and returning to the citizens for monitoring, evaluating and learning, present cyclic dependencies.



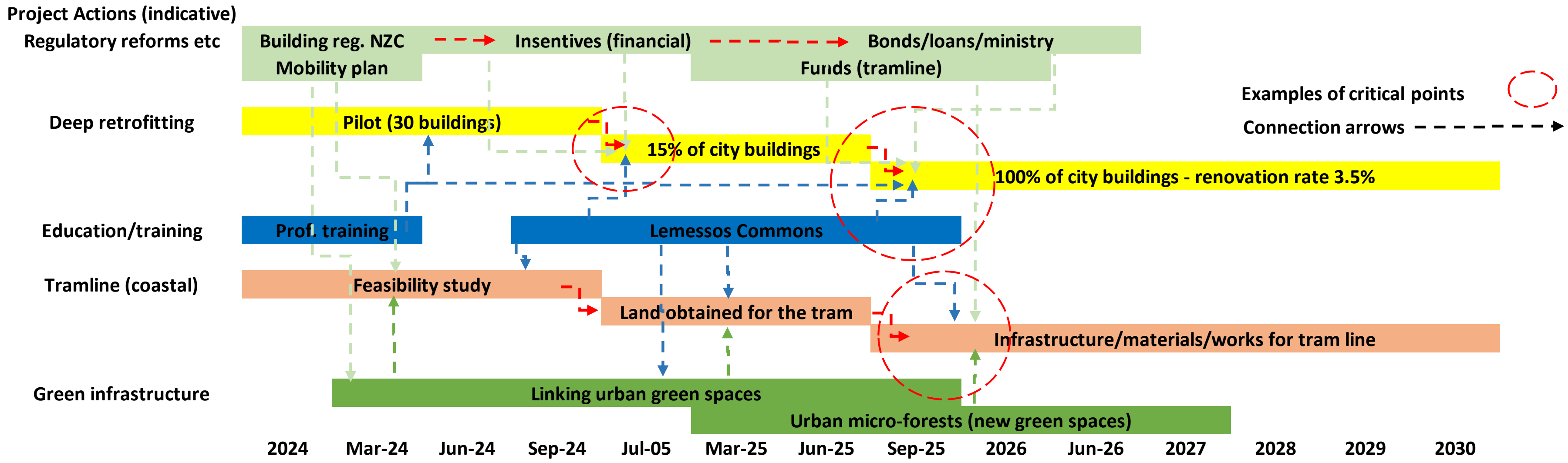
Implementation: Growing Spiral

The figures above present an example of upscaling the actions towards NZ in the city of Limassol. Systemic levers (e.g., Technology, education, governance, funding) are involved in the impact pathways towards zero GHG emissions, with socio-economic and environmental co-benefits. The example presented in Figure 2 is related to deep building retrofitting and is indicative of the process to be followed in the Transition, for non-scalable actions. To start, small projects (30 buildings) will be launched in combination with policy reforms (e.g., net zero building code), financial instruments (e.g., incentives, loans, bonds) and training (e.g., remedy, lack of professionals for deep retrofitting towards NZ, unreliable supply chains). These are the niches for shifting from the “old situation to the new”. Small project implementation with be the foundation for larger-scale projects to achieve higher rates of building renovation that will support GHG emissions mitigation and neutrality.

1.4.5 Work Progress and Timing

In the Transition time is the critical resource. In its implementation credibility with respect to time is very important for stakeholders and citizens who are often expecting a better situation while enduring difficulties (for example while significant infrastructure projects are implemented).

Critical points Gantt chart



Critical path methodology

To achieve NZ in the city of Limassol, about 30 actions will be implemented, each involving dozens of activities to be implemented by hundreds of projects, large and small. The Transition requires a complex project management scheme, with very strict timing to achieve NZ by 2030. Critical point identification is essential for sound management of the CCC (and chaos management! E.g., X curve). The chart provided gives an example of our approach to managing the work for Lemesos NZ. It presents the CCC work approach for identifying and managing critical points during project implementation.
Example: deep retrofitting requires technical projects (e.g., pilots), legislative revisions, professional training, and funding schemes, tailored to the citizens of Limassol. In addition, the projects are interrelated and interact with the other actions / objectives of the CCC (e.g., green infrastructure, tram line). Moreover, several projects of the CCC will be upscaled (e.g. retrofitting) while others will be linear (e.g., construction of the tram line).
An example of a critical point (in the renovation case) is identified at the point after the implementation of the pilots. Upscaling deep retrofitting of buildings in Limassol, which is key to NZ, is linked to the success of the pilot projects, updating current legislation, and creating a favorable financial setting for citizens to proceed with deep renovation. In addition, citizens' approval of such projects is required, which is linked to the success of the "Limassol Commons", our civic Transition institution. Large-scale building renovation in reduced time interacts with other construction projects (e.g., tram and green infrastructure), so, critical path identification is essential for Transition management at the macro and micro levels.

Work Progress and Plan

1. NZC Mission EoI (January 2022)

Lemesos Municipality (L.M.) embarked on a transformative journey by expressing its keen interest in formalizing and integrating its commitment to sustainability and the UN Sustainable Development Goals (SDGs). Prior to this, the city had pursued sustainability through various studies and rather disconnected environmental protection policies, plans, and projects. This expression of interest marked a pivotal moment in channeling the city's economic development towards a more sustainable future.

2. Lemesos accepted in NZC Mission (April 2022)

By April 2022, L.M.'s application was accepted, setting in motion the city's focused efforts to enhance its Municipal Capacity Building, with a specific emphasis on climate resilience and the following results and plans.

3. Establishment and operation of the internal Transition Team (May 2022 - today)

The city established a Climate Transition Team from various municipal departments, the Mayor and city counselors, and the Cyprus Institute (CyI) as the city scientific advisor to lead and coordinate its climate sustainability activities. This team plays a crucial role in coordinating and guiding L.M. towards its climate resilience goals.

L.M. entered into a collaboration agreement with the Cyprus Institute (CyI), a significant step towards forging partnerships and leveraging scientific expertise in the pursuit of sustainability.

4. Engagement with Stakeholders and Citizens (June 2022 – today)

L.M. recognized the importance of involving stakeholders and citizens in the sustainability journey. Effective communication and meetings have been held to garner input, feedback, and support from the community.

5. Pilot Project Application (September-November 2022)

In the latter part of 2022, a pilot project application brought together various stakeholders, including the municipality, CyI, Cyprus University of Technology (CUT), ETEK, and Friends of the Earth (FoE). This collaborative effort aimed to develop a proposal that highlighted the essential components needed to establish the Climate Change Committee (CCC).

6. Formation of Thematic Teams and collaboration agreements (February 2023)

In February 2023, thematic teams were formed, marking a critical step in the structured approach towards sustainability. These teams would focus on specific areas crucial for achieving sustainability goals.

Public thematic workshops were conducted, involving stakeholders and citizens. These workshops provided a platform for collaborative discussions and idea-sharing, further strengthening the city's sustainability framework.

7. City Advisor's Visit and Presentation to City Council (March 2023)

In March 2023, the City Advisor Project Week played a pivotal role in refining the city's sustainability strategies.
A week-long visit by the City Advisor provided valuable insights and expertise. It included discussions with the Mayor, city counselors, and Municipality staff, the thematic teams as well as online meetings with other Mission staff. Following this, a presentation was made to the City Council followed by a discussion to gain support and approval for the climate initiatives.

8. Central government support (April 2023)

In April 2023, a conference was held to garner support from Cyprus Republic leadership, including the President of Cyprus, who publicly declared his support for Lemesos Mission, followed up by a decision to include it as a separate chapter in the National Energy and Climate plan.

9. Success of the Lc3 pilot project – Bootcamp – Kickoff (April – September 2023)

During this time, the Lc3 proposal was deemed successful, signifying progress towards sustainable practices. The ‘bootcamp’ process was very useful for the whole project team.
The grant agreement was signed in July (official start of the project June 1) with an online kickoff in July, σ in-person kickoff in September.

10. Milano Summer School (June 2023)

Two members of the Transition team attended the Milano summer school, very useful for drawing up the CCC.

11. Commitments document and Action Plan version 1 (30 June 2023)

The first version of the Action Plan and commitments document were developed by the thematic teams in cooperation with Municipality staff, City political leadership, stakeholders and citizens through workhops.

12. Cyprus Network of NZC Cities: (July 2023)

L.M. established the Cyprus Network of Net-Zero Carbon (NZC) Cities, establishing its place within a broader sustainability network.

13. Open Workshops and Investment Plan: (July-August 2023)

In July 2023, open workshops engaged city council members, municipality employees, and stakeholders in discussions about the Action Plan. This collaborative effort paved the way for the development of an Investment Plan in August 2023, which involved thematic teams and the CCC coordination team.

14. CCC Adoption and Signing: September 2023

September 2023 marked a significant milestone as the city's mayor, city council, and central government formally adopted and signed the Climate Change Committee (CCC), cementing their commitment to sustainability.

15. Lc3 Activities accelerate (September 2023 – May 2025)

Lc3 accelerates L.M. capacity building; participatory co-design solution workshops for the built environment
LM Transition team with full-timers; regulatory sandbox; Lemesos Commons operation

16. Transition Projects Stage I (Oct 15, 2023 – Oct 15, 2026)

See Appendix I of Action Plan for projects, short descriptions, budgets and timelines.

17. CCC version 2, March 2024 and version 2.1, September 2024

Public consultation through co-workshops of CCC version 1
Development of CCC version 1
February-March 2024: inclusion of Mission feedback from CCC v1 into v2
March 15 2024: Submission of CCC v2

The period from October 2023 to March 2024 an acceleration in Lc3's efforts will take place, including the expansion of the Transition Team and intensification of Municipal Capacity Building. LM Transition team with full-timers. This phase involves extensive public consultation through co-workshops, that will lead to the development of the second version of the CCC. Feedback from CCC v1 will be incorporated, and by March 15, 2024, the CCC v2 will be submitted.

This cycle of progress will be repeated in September 2024.

18. Next CCC versions

We plan to establish a CCC MEL mechanism which will:

(1) Create a detailed (civil-engineering project-like) plan

(2) Record progress, delays, mistakes, and good practices
(3) Produce a minor CCC revision every September and a major revision every March (until March 2031 which will conclude the 2022 – 2030 Lemesos Climate Transition)

1.5 Barriers, Opportunities, Risk Analysis

1.5.1 Emission sources, solutions and barriers

Main sources of emissions in Lemesos, from our baseline (2018 emissions):

1. Buildings for cooling (scope 2)
   The urban heat island requires artificial cooling for living and working spaces; the current straightforward way for this is individual space air conditioning (A/C), which uses fossil fuel produced electricity, exacerbating the problem into a vicious circle.
2. Mobility and transportation (scope 1)
3. Buildings for heating and other (scope 1 and 2)
4. Waste management (approx. 80% of MSW goes to the landfill).

Basic solutions:

1. Reduce the urban island effect (reduce ambient city temperature by 3-4 degrees, utilizing open spaces, sea breeze, road and roof surfaces, shading and colors).
2. Smartly retrofit buildings.
3. Produce and ensure consumption of RE.
4. Reduce motorized mobility.
5. Electrify transportation with RE
6. Minimize the amount of MSW ending to the landfill (e.g., household shorting of organic)

Main barriers and corresponding solutions/opportunities:
Internal barriers

1. The municipality itself (regulatory competence; human resources; organizational; attitude); and the competent national authorities in general who must become part of the solution -not of the problem, as they often are now.

➔ Municipal capacity building; regulatory sandbox; "Lemesos Mission 2030" organization

2. The current city plan.

➔ The city was never designed /built for the currently and new expected temperatures; many of the mitigating factors half a century ago no longer apply (smaller density, more open areas, more green, less traffic, more paved space, demand for outdoors cooling). There are now fewer, more difficult, drastic, and expensive solutions, and Lc3 will pilot some. Moreover, under the current regulatory framework the City does not have sufficient jurisdiction; but even if it did, social and economic forces make climate positive land use very difficult, since the value of land for "development" (i.e., more building) is very high and the consequent strong interests from various groups.

3. Social attitude (lack of collective culture/attitude/behavior); stakeholder knowledge, attitude and will; Myopic special interests; fear of the unknown; Comfort zone

➔ Co-workshops; Lemesos commons (see Section 1.3.2)
See Section 4.2 second priority guiding principle.

4. Financial (myopic greed; fear of risk; distrust of long-term)

➔ See Investment plan.

5. Human resources (Quality & Quantity)

➔ Educate and training programs; educate-at-scale.

External barriers:

6. Cyprus being an island and the fact that a large part is under Turkish military occupation renders (a) supply chains unreliable and expensive and (b) international and EU electric grid interconnection very difficult, expensive and subject to difficult regional politics.
7. Time (changes of this magnitude in such a short time happen only in times of war)

➔ Must create a feeling of emergency socially.

8. Invisibility of emissions and long-term catastrophic result.
No direct benefit of city-only emissions reduction, since under all scenarios Lemesos, located in the Eastern Med and Middle East, will be getting hotter due to climate change, more so than the global average (eg. 2ºC global will be 3ºC regional, ref Zittis etal). An additional (social and psychological) challenge from such barriers is that it aggravates feelings of helplessness.

➔ Need to tune the communications campaign: focus on heat and public health instead of GHG; on sea pollution instead of seagrass; on personal money savings instead of social energy savings); balance motivators (personal job opportunities; …) and restrictive/prohibitive measures (parking; traffic; building property transfer) Also highlight adaptation to climate change. A microforest or the unification of green spaces will act towards cooling the city and allow people enjoy the city, even if there is a 3 degrees increase by 2050.

1.5.2 Opportunities

Opportunities are related to **structural and other funds** that are actively involved in several large projects in Cyprus (e.g., the building industry, RE, Shipping), **the financial sector** in the island which is a strong part of the national economy (deposits, investments), there **are top ranked universities** and **research centres** that include experts in all the thematic cpmponents that are related to the transition. **The port and the coastal front** of Lemesos are huge assets (nationally and internationally). The **NZC mission and the EU regulations/strategies** (eg Green Deal, Waste, One Health) favour the actions that are linked to the transition, many of which are national obligations towards the EU (e.g., applying the waste management directive). Another important opportunity lies in the establishment of **Lemesos NZC 2030, Inc,** which will support the municipality for the implementation of the actions related to NZ. Finally, **the size of Cyprus is small** in comparison to other EU countries (and could be comparable to a small district of Italy), which has the advantage of personal connections to important stakeholders.

There will be also ample **job** and **entrepreneurial** opportunities by the Transition. The main challenge is that these are not by definition equally distributed, so extra care will be given to foresee and act early.

1.5.3 Risk analysis

The main implementation risk, integral to the central objective of the Mission is the overall time frame 7 years. Such huge changes task place in decades if not generations -except during wars or revolutions. The shorter the time available, the more innovation and risk are necessary, which means that the probability that they will be ineffective or unattractive is higher.

More specific implementation risks relate to
- unreliable global supply chains, especially for an island.
- Limited know-how, available personnel and regulatory competences inadequate.
- The possibility of degeneration of co-workshops (from workshops to lectures, from co-design to voting) and the Limassol Commons (partisanship).

Social risks:
- Cypriot society is particularly conservative.
- A significant minority of the population (cf anti-vaccine movement) is not convinced by scientific arguments.
- Failure in appeasing those hit by the Transition and especially providing opportunities for jew jobs and SMEs

Financial risks
- Attracting sufficient capital in a period when several cities with greater credibility will be competing for capital for the same purposes.
- The global economic situation, including EU inflation is a significant financial risk.

Political risks:
- Climate mitigation/adaptation becoming a partisan issue.

Scientific risks
- Carbon monitoring for a city like Lemesos municipality (small) is especially difficult given the lack of data.

1.6 Impact and KPI's

1.6.1 Impact pathways

The Transition will monitor, evaluate and learn from changes in three fields:

- Social – psychological – human: understanding; shifting attitude.
- Emissions: actual and potential.
- Side effects: Balance positive and negative.

Economic analysis:
a. Climate change - adaptation: apply the di lampedusa principle
b. from Fuel dependency to local resilience. Cyprus currently spends the largest amount of imports for energy. Closing the sink through which capital is flowing out of the local community for the import of fossil fuels, and other heavy transport dependent articles for which alternatives of equal standards are available.

The prevented capital drain, will be used as a threefold leverage: as a social lever (creating direct benefits for vulnerable households), a financial lever (to attract external capital upscaling climate action), a practical lever (e nabling project with a more complex business case - planting trees)

1.6.2 Key Performance Indicators

KPIs management plan

For the NZ Lemesos 2030 Actions implementation, a KPI management plan will be followed. The plan is crucial for ensuring that the progress (or lack thereof, or regress) towards the strategic goals can be effectively tracked and measured. The principles of the approach for the KPIs plan are provided in the table below. Additionally, the philosophy for generating KPIs is provided below. Each of the Actions (see section B of the AP) includes indicators for managing activities and their related projects. The KPI management plan will not be static; it will evolve with transition's changing goals and priorities (and according to MEL). By following a structured plan, the mission could effectively measure, monitor, and manage KPIs to improve and learn from the process.

KPIs development and management plan

Steps	Comments
Clear Objectives	Specific, measurable, achievable, relevant, and time-bound (SMART). (E.g., Electrify public transportation by 2031 to reduce GHG emissions from the transportations sector by 20%).
A KPI for each objective	Measure progress. (e.g., % of the buses electrified per year).
Targets	Indicate what success looks like (Targets and benchmarks). Challenging but realistic (e.g., 35% of buses are electric by 2025)
Data Collection and Sources	The data sources (accurate, reliable) for each KPI.
Frequency of Measurement	Some KPIs may need real-time monitoring, e.g., traffic in a pilot transportation project while others may be assessed on a monthly, quarterly, or even annual basis.
Data Analysis and Reporting Visual Representation MEL	A process for analyzing the collected data and generating reports accessible to relevant stakeholders. Data visualization tools/dashboards.
Thresholds and Alerts	Implement threshold values for KPIs (set up alert systems).

Regular Review Meetings Continuous Improvement	Identify areas that need improvement / adjustments to the plan / corrective actions.
KPI Ownership Capacity building	Assign each KPI to specific individuals or teams (accountability). Train people (importance of KPIs, data collection etc).
Document the Plan	Document the entire KPI management plan. Deliverable (open access) available to all relevant stakeholders.
Review and Adjust	Annually review the KPI management plan. Adjust KPIs and targets as necessary.
Celebrate Success	Celebrate achievements and milestones. Recognition and motivation.
Feedback Loop	Feedback on the KPI management process and suggest improvements.

KPIs for the transition

Rational for KPIs development

KPIs involve those directly related to ***GHG emissions mitigation or avoidance*** which could be actual or potential from upscaling. For instance, a successful pilot project related to deep retrofitting, where GHG emissions mitigation is accurately determined (actual) could be upscaled and the emissions mitigation is estimated (potential). Crucial for the transition is to set a process (using KPIs) that evaluates in what degree ***mistakes are realized***, understood, explained, and learned how to avoid. Since the transition is tightly linked to changing citizens' views and practices KPIs should involve the ***social*** (attitude shift) dimension and additionally focus on ***inequality*** ("no one left behind"). ***Economic and financial aspects*** should be incorporated and monitored, such as citizen participation; smart financial instruments; competitive funding; green Jobs created; unemployment reduction and/or avoidance.

The KPIs should be used for monitoring and evaluating implementation; the ***timing of implementation*** (actual vs. planned) is important; ***funds*** absorbed; scalability and transferability; project failed or stalled (and why).

In general, KPIs need to be employed to monitor the following two dimensions of the transition:

(a) whether what was planned is being implemented and

(b) if the impact from what has been implemented is according to what was expected in the Transition plan

KPIs for different thematics of the transition

- **GHG Emissions (CO_2eq and individual GHGs)**

Yearly baseline for previous year: emissions from sectors (Energy, Buildings, Transport, Waste, Port).
Yearly emissions reduction from each of the Actions proposed.

- **Energy**

Monitor the national grid mix (change by 2030 to reduce the emission factor): % of diesel, natural gas, RE.
Compared to the national grid, how much better is the RES electric energy used in Lemesos.

- **Built Environment**

Sq meters being deeply renovated and % use of energy in class A-B buildings.
Heat island effect reduction after NBS for urban regeneration.

- **Transportation**

Car electrification, Bus electrification (% of total cars, buses in Lemesos)
What % of electricity used to charge EVs is RES (clean energy)
Optimization of freight transport (and resulting GHG and pollutants emissions reduction)

- **Waste**

Amount and % or organic waste collected, used to produce electricity.
% reduction in the MSW (Municipal Solid Waste) that goes to the landfill.

- **Regulations**

Monitor regulations missing and regulations obstructing.

- **Participation and Governance**

Social attitude (Social spectrometer) towards and **Public opinion** regarding: Climate change, the EU Green Deal, the Cyprus Transition, the Lemesos Transition. Lemesos Commons: Members and number of meetings/sessions conducted; impact in Municipality planning towards the transition; behavioral change of members.

- **Jobs and SMEs; innovation**

Green jobs created; Start-ups founded and involved to the projects and activities; existing SMEs involved in the transition process.

- **Carbon offset (NBS; marine environment)**

C storage potential in urban regeneration projects and in the marine environment (C sinking).

- **Digital systems**

Data collection processes and systems; Digital twin and the capacity to support planning (scenarios) and management of the transition projects. Data utilization efficiency.

- **Implementation**

Projects: started, % completed, % useful for the transition (effective in GHG emissions mitigation and urban environment improvement)

In sections B-3.1 and B-3.2 there are numerous indicators that were developed by the thematic teams, for monitoring the proposed Actions/activities/projects. Some of them, could be employed as KPIs while additional KPIs could be developed, based on what is presented in the above paragraphs. In Table B-3.1. for instance, there are KPIs [e.g., Grid emissions factor (tCO2eq/MWh)] where target values are also provided (e.g, EF → 0.5 for 2025 and 0.285 for 2030). These will be capitalized for KPIs management and monitoring. Indicators metadata are also provided in B-3.2., following the SMART (Specific, measurable, achievable, relevant, and time-bound) approach.

1.6.3 Monitoring, Evaluation and Learning

Monitoring, Evaluation, and Learning (MEL) is a crucial framework employed Lemesos Transition, to assess the effectiveness and impact of action portfolios, actions, projects, and initiatives. Briefly, it represents a systematic and iterative approach to gather data, track progress, and make informed decisions related to the NZC Lemesos mision. MEL will help the municipality, the stakeholders, the citizens to understand not only what is working well but also what needs improvement, facilitating evidence-based decision-making.

It encompasses a continuous cycle of data collection, analysis, and interpretation, allowing for the identification of successes and challenges while supporting the revisions of the CCC.

Moreover, MEL places a strong emphasis on learning from experiences (Lemesos Commons, Co-Workshops, storytelling), enabling all the actors to adapt and refine their strategies, ultimately enhancing their ability to achieve their goals/KPIs and contribute positively (not necessary successfully). MEL could be imagined as a compass, guiding Lemesos NZ journey toward effectiveness, efficiency, and impact.

1.7 Side effects and other issues

Reducing emissions of climate-warming pollutants (GHGs) (and consequent results such as lower ambient temperature) have many other co-benefits, many of those related to people's health. These health benefits have been widely described, and in fact the IPCC has stated that mitigation strategies, when properly implemented, can have significant beneficial impacts on public health. In Cyprus specifically, on-going preliminary studies are showing correlation of extreme temperatures with increased mortality in susceptible populations (65 y.o. and above), and this will most likely increase as the years progress and in a business as usual scenario.

Some of the most relevant benefits of GHGs reduction come from reductions in air pollution, however some climate-warming agents (such as ozone and black carbon) are also important air pollutants associated with negative health effects. Therefore, reductions in GHG emissions are often linked to reductions in these disease-causing air pollutants, which increase many pathologies such as cardiovascular diseases, allergies, asthma, lung or skin cancer and may even affect the mental development of children.

Various actions developed within the action plan of the Limassol CCC, especially from the transport and mobility, built environment as well as coastal and sea thematics, aim at reducing GHGs emission by increasing green public spaces, expand the pedestrian network, promote micromobility, combat the heat-island effect positively, and create a 15 minute city. These type of actions have a great positive impact on human health by increasing physical activity, fostering social contact, and providing opportunities to enjoy natural environments. These healthy behaviours have been reported to reduce mortality, but also mortality risk of serious diseases such as obesity, diabetes, cardiovascular problems and depression.

The health co-benefits are particularly important as they can be also translated to productivity (gained or lost) of the active population, which in a city such as Limassol (important for trade, with industries etc) represents a high percentage of the total population.

1.8 Annex I: 2023-26 Exemplary Project summary

For the 36 months starting October 15, 2023, the following projects are planned:

	Project	Start	Months	(M€)	23	24a	24b	24c	24d	25a	25b	26
1	Co-W / LC	Feb-23	45	3								
2	Lc3	Jun-23	24	1.5								
3	Green jobs	Dec-23	36	1								
4	Social Innov	Jan-24	10	1								
5	Studies			3								
5.1	Cold Iron	Feb-24	10									
5.2	Tram line	Feb-24	10									
5.3	Build Retrof	Mar-24	10									
5.4	RE w. Storage	Mar-24	10									
5.5	Sea as carbon sink	Apr-24	10									
5.6	Non-solar RES	May-24	10									
5.7	Cooling sea	May-24	10									
6	Lem NZ '30, Inc	Jun-24	30	1								
7	Regulations	Jun-24	18	0.5								
8	Local RE Storage	Jul-24	30	80								
9	Build Retrof	Sep-24	30	50								
10	Heat Island/Urban F	Oct-24	30	50								
11	mForests/Sea grass	Nov-24	27	20								
12	DigTwin	Dec-24	27	1								
13	Scale/Transfer	Jan-25	24	0.5								
14	EmissionMonitoring	Feb-25	20	1								
15	Financial Instr	Mar-25	15	0.5								
				214								

Project characteristics:

1. Maturity[1]: R(eady) – 6 (months preparation needed) – L(onger preparation needed) – U(nsure)
2. Integrated pilot[2]: Yes/No
3. Funding: A(vailable) – PA (Partially available – KS (Known Sources) – P:LM/P:CG/P:EU (Public: Lemesos/Cyprus/EU) – PPP – Inv (Investor) – CS (Crowd sourcing)
4. Scalability[3]: H(igh) – M(edium) – L(ow) - None
5. Transferability: H(igh) – M(edium) – L(ow) - None
6. Supporting[4]: S(ocial), OD (Observation/Data), St(udy), R&D, …)
7. Social innovation – broad attractivity[5]: Y/N
8. Democracy and participation: Y/N
9. Emissions reduction: Direct/INDirect; cost/performance: H-M-L; size: H-M-L)
10. Very difficult ("heavy weight": Long duration, high risk, extra difficult)

[1] Maturity: Regulatory, feasibility, environmental, technical, detailed implementation studies; financing; human and technical resources

[2] Integration: "Missionlets" – Integrated pilot projects (systemic, integrating proposals from more than one thematic spatially focused, suitable for demo)

[3] Scalability: "Fireworks" – Scalable projects (easily repeatable with small changes in larger sizes)

[4] Supporting: Projects with indirect emissions impact, such as stakeholder involvement, data gathering, digital systems, education/training

[5] Broad attractivity: "Let 100 flowers bloom" – Small projects supported by organized groups of citizens

	Maturity	Integratin Pilot	Funding	Scalability	Transferabili ty	Social Innovation	Democracy participation	Emissions reduction	Very difficult
1	R	N	KS - P	H	H	Y	Y	Ind	
2	R	Y	A - P	M	M	Y	Y	S:L	
3	6-10	N	KS - PPP	H	H	Y	Y	Ind	
4	6	N	KS - PPP	H	H	YYY	Y	S:L	
5.1-6	6	N	KS – P:EU, Inv/PPP	N	L	N	N	S:H	***
6	L	N	KS – P:LM	N	M	Y	Y	Ind	
7	L	N	KS – P:CG	L	L	Y	N	Ind	
8	L	N	KS – PPP	M	H	Y	N	D/S:H	
9	L	N	KS – Inv	M	H	N	N	D/S:H	

10	L	N	KS – PPP	Y	H	N	N	D/S:H	
11	6	N	KS – P:LM/CG/EU	M	M	N	N	D/S:H	
12	L	N	KS – P:LM/CG/EU	M	M	N	N	D/S:H	
13	R	N	KS – P:EU	L	H	N	N	Ind	
14	L	N	KS – P:LM	L	M	N	N	Ind	
15	6	N	KS – P:EU	N	H	N	N	Ind	
16	L	N	KS – PPP	L	M	N	N	Ind	

1. Citizens and Stakeholder engagement: Co-workshops and the Lemesos Commons
Short description: Hundreds of participatory co-design solution workshops (see 1.3.4) will be conducted throughout the Transition with citizens (2023-30) and stakeholders on specific issues affecting them in order to design solutions that take into account all views. The Lemesos Commons will review projects proposed and comment before the City Council and NZ Lemesos 2030 Inc. start implementation.

2. The pilot Lemesos City Cooling Challenge Lc3
Short description: Already approved and started Mission Pilot project (2023-25) focusing on reducing cooling needs by dealing with Urban Heat Island effect; reducing energy needs for cooling buildings by ‘smart’ interventions; and reducing emissions by producing local RES electricity.

3. Transition to Green jobs and Green SMEs
Short description: The tremendous emerging job and business opportunities that the Transition will cause in the city will not automatically be available to people and SMEs negatively affected by it. Medium and long-term planning and implementation for education, training, skills and attitudes along with regulatory and financial provisions will ensure positive economic outlook for all.

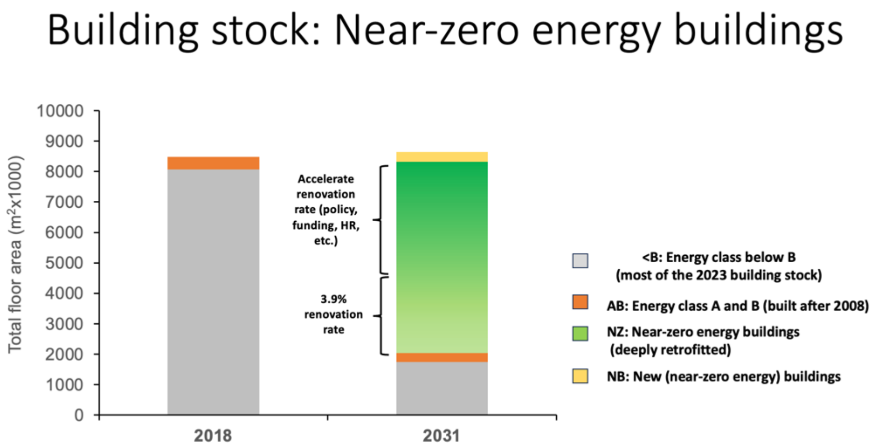
4. Social innovation: “Let 100 flowers bloom.”
Short description: 10 yearly projects x 30K€ x 3 years. Dozens of small bottom-up social innovation projects proposed by citizen groups, stakeholders such as schools, neighbourhoods etc will be designed with the help of L.M. and NZ L 2030 Inc., and implemented by the proposers with financial and managerial support from L.M. The purpose is (1) to test scalability and (2) to keep citizens active in supporting the Transition through what concerns them most.

5. Maturation of tough or risky projects:
A few projects present unique difficulties, risks or uncertainties. Including them in or excluding them from the Lemesos Transition plan is a decision that cannot be taken without a significant feasibility and detailed technical study that will reveal specific barriers, costs and assess timing and benefits. For them

5.1. Moored vessels cold ironing
Short description: Preliminary technical study. The Cold Ironing initiative at Limassol Port provides a method for shore-side electrical power to docked ships, minimising the need for onboard diesel generators and thereby cutting emissions and improving air quality. Supported by various EU policies and offering financial incentives, the action promises significant environmental, economic, and employment benefits aligning with international sustainability goals.

5.2. Tram line (coastal)

Short description: Feasibility study. Lemesos coastal topography is ideal for a tram line crossing the city which would, additionally to an excellent public transportation means allow the large number of passenger cars from other cities reaching the city center for work to park-charge-n-ride. It would be a significant expense (order of 200M€) and requires an extensive technical and economic feasibility study.



5.3. Large scale building retrofitting (Stage 3)

Short description: Detailed technical study

Retrofitting buildings at a rate that will allow NZ from this sector presents difficulties that have not been overcome anywhere. Suitable work force, material supply chains and financing will fail us. A detailed study is needed if we are to accelerate and aim at a retrofitting rate more than 4% annually (deeper green color in the chart).

5.4. Large-scale RES storage and consumption

Short description: Preliminary technical study

Currently the bottleneck in RES is the national grid. For Lemesos to become NZ by 2030 a much larger percentage of RES must be produced and consumed. Storage and focused consumption (such as for cold iron at the port, energy communities, EV charging with favorable terms but unpopular timing are some of the solutions that the study will examine.

5.5 Sea as a Carbon Sink: Posidonia Oceanica

Short description: Preliminary technical study

Posidonia oceanica, an endemic seagrass in the Mediterranean Sea plays a significant role in carbon sequestration and sinking (blue carbon). *Posidonia oceanica* has the capacity to store vast amounts of carbon in the root system called 'matte' for centuries to millennia, a feature that sets it apart from several terrestrial ecosystems considered to be efficient in carbon storage. *Posidonia oceanica* seagrasses sequester CO_2 at a much faster rate than tropical forests and can store the carbon for much longer periods (Pergent-Martini *et al*., 2021). A study using high-resolution seismic reflection imaging estimates that the carbon stock stored in matte is 15.6 ± 2.2 million t C_org (Monnier *et al*., 2021). The purpose of the study is tuantifying the precise amount of carbon sequestration and sinking by *Posidonia oceanica* which requires dealing with factors such as regional variability, site-specific conditions, and methodological limitations in measurements.

5.6 Non-solar local RES production

Short description: Preliminary technical study. Although solar is the 'obvious' source of RES in Cyprus, wind and wave (for desalination) energy are alternatives to be assessed, as well as hydrogen for vehicles.

5.7 Cool coastal Lemesos using deep sea water cooling

Short description: Using cold sea water for cooling buildings for (at least) the coastal area of Lemesos, including hotels, following examples of other cities such as Copenhagen, will be studied as an alternative:
https://www.danfoss.com/en/service-and-support/case-stories/dds/seawater-cools-copenhagen-city-cutting-emissions-by-70/
https://c2e2.unepccc.org/kms_object/district-energy-a-case-study-of-zakito-deep-sea-water-district-cooling-in-curacao-webinar-30-09-2022/

6. "NZ Lemesos 2030, Inc"
Short description: Detailed design, set up and initial operation of NZ Lemesos 2030 Inc, the organization that will be the executive branch of the Transition, initially designed by and Lc3 activity and established by L.M. as a multi-shareholder company.

7. Regulations and Regulatory sandbox (Buildings, Transport, Energy Communities)
Short description: Legal, lobbying for relaxing regulations, adopting new, and adding city competences that will allow the acceleration required. This project involves legal work and 'lobbying' the central government as well as the parliament.

8. Local, small scale RE production
Short description: Using small and very small open spaces such as rooftops, bus stops, pedestrian ways etc.

9. Local, small scale and focused RE storage and consumption
Short description: Smart meters, energy communities support to enhance the RTES percentage of Lemesos in the grid.

10. City-wide Building deep retrofitting Stages 2 and 3
Short description: Going beyond the 4% renovation rate for buildings.

11. Urban regeneration: Reducing City Heat Island effect through open space utilization and smart interventions Stages 2 and 3
Short description: Design and implementation of interventions to deal with the Urban heat island.

12. City micro-forests - NBS
Short description: Micro-forests (urban mini-forests or pocket parks) will be compact green spaces, meticulously designed and cultivated within the Lemesos urban landscape, to serve as vital ecological oases. Micro-forests not only enhance urban aesthetics but also provide ecosystem services (improve air quality by absorbing pollutants, C sequestration, mitigate the urban heat island effect , and support biodiversity).

13. Digital Twin and related (public, open) city for-climate repository
Short description: Expand and enrich the online integrated digital platform "Portal for hERItage buildingS") that aims to stimulate deeper city regeneration activities regarding energy retrofit of existing building stock to contribute to the need for climate resilience communities by contributing to overcoming the challenges of the building industry and the management of our built environment:
Deal with authorities lack of Data (that would enable them to have knowledge of change, in time); and Tools (that would allow them monitoring and visualising the built environment, a capacity that would empower better interpretation of the city's complexity).

Professionals lack of Data (due mostly to the lack of interdisciplinary know how, its higher cost and labour of production of these specialized type of data). Owners' lack of Incentives, guidance for renovation, appreciation for the cultural value of heritage.

14. Scale and Transfer: Greater Lemesos; Cyprus NZC network
Short description: Feasibility studies and communication. Lemesos has an open view towards collaboration with the Metropolitan area, and will share experiences, capacities and possible funding opportunities with a coalition of the willing, starting with the Cypriot cities that applied to the Mission (network already established), extending to the municipalities in Metropolitan Lemesos, and then to other Mediterranean coastal cities.

15. Emissions monitoring
Short description: Beyond just modelling, actual emissions monitoring at the level of a medium-size city is particularly challenging. Methodology: 1. Downscale the national emissions from the National Inventory Report to the city scale by taking into consideration the population and activities of Limassol. 2. When more precise data on the city of Limassol becomes available, such as building efficiency, energy consumption, and traffic counts, a bottom-up approach can be used to calculate the city's emissions and find efficient ways to reduce them. 3. utilize remote sensing methods as a better representation of urban metrics, and emission fluxes could be deployed for the case of the Limassol city towards the validation and correction of the compiled emission inventories, complementary to the use of other pollutants (e.g., CO) as proxy components for GHG spatialization. This methodology can be applied in the net-zero city emissions inventory as a validation method after the establishment of the baseline inventory

16. Smart green financial instruments
Short description: Design and promotion
Green smart financial instruments will be designed in collaboration with and perhaps launched by the end of Lc3 will cover longer-term financial viability along with L.M. services which can undertake some of the maintenance cost.

1.9 Annex II: Short presentations of the thematic area Actions

1.9.1 Energy

The energy sector is fundamental not only for the transition but for urban sustainability. The portfolio of actions includes the following:

1. *Reduction of GHG emissions due to change in electricity production mix to 2030*

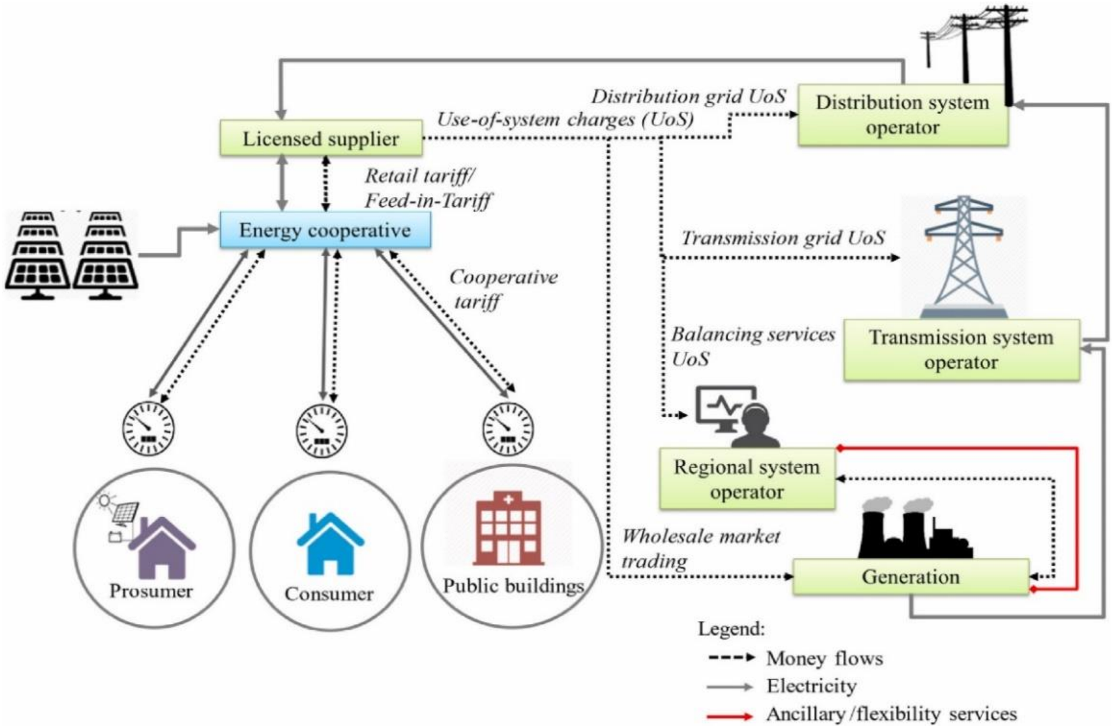
This action is beyond the control of the municipality, but it is significant. Cyprus will undergo a rapid expansion of its PV installed base in the next few years (leading up to 2030) and replace HFO and diesel use in power generation with Natural Gas. This will significantly lower the emissions factor for scope 2 emissions and has cascading effects on all measures that rely on grid electricity.

2. *Install a large-scale photovoltaics park and establish an energy community*

Establish of energy community (Figure 5) within the municipality of Limassol by engaging various stakeholders and citizens. The energy community will consist of a large-scale PV park and energy storage technologies, aiming to satisfy the energy demand of end users and make considerable GHG savings.

3. Install a 200kWth Fresnel system to provide Industrial process heat

Fresnel systems utilise solar energy and can provide heat at low and mid temperatures. Therefore, they can become an alternative option for supplying clean energy to commercial and industrial facilities.



***Energy community structure*.**

4. Renewables in residential buildings with behind-the-meter storage (with built environment)

Install photovoltaics at residential buildings in Limassol with behind-the-meter storage systems. This action will turn citizens into prosumers and reduce electricity consumption from the grid significantly. In addition, installation of storage units will further increase energy autonomy.

5. *Install heat pumps at commercial and residential buildings (with built environment)*

Heat pumps are the most efficient technology for thermal generation. They can be used to provide heating (including hot water) and cooling in buildings. These units can replace boilers or other conventional technologies and reduce carbon emissions significantly.

6. *Centralised RES generation and long-term storage to satisfy increased demand from Mission actions.*

This action proposes the installation of a hybrid RES system that consists of a large PV and wind park, coupled with Long-Term Energy Storage (LDES). The primary goal of this action is to satisfy the increased demand in electricity that arises from actions taken for Lemesos Mission, including elevated demand for EVs and heat pumps.

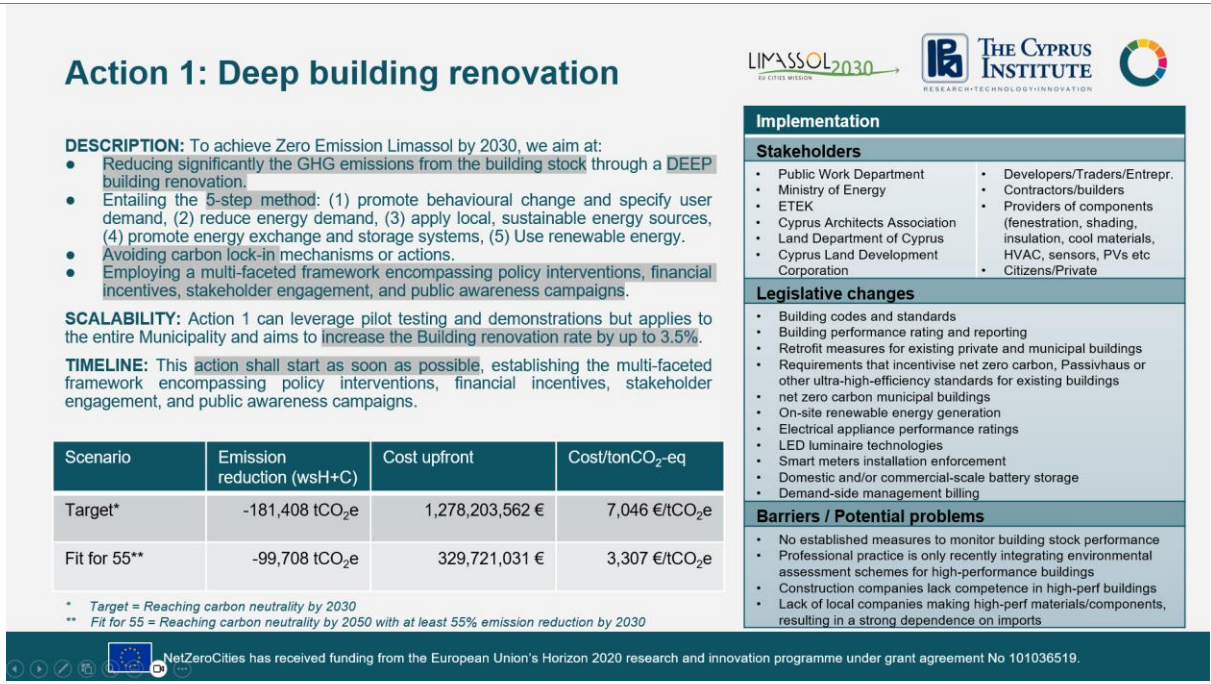
1.9.2 Built Environment

Limassol is a European Southern Coastal city with increasing tourism trends and a high carbon footprint. The building stock is responsible for a significant portion of these emissions, as many buildings are old and inefficient. Currently, no established measures are available to monitor the city's performance, and professional practice has only recently integrated environmental assessment schemes for promoting high-performance buildings. Moreover, construction companies, particularly small and medium enterprises, lack competence in high-performance building construction. In addition, there is a lack of local companies that can produce needed high-performance materials and components, resulting in a strong dependence on imports.

Furthermore, several open spaces of the city, car parks, bus stops, and pavements are planning and private development leftovers or neglected spaces, which result in unattractive, often unsafe, and uncomfortable, especially to cope with heat stress during the summer period, and as a result they tend to prevent social interaction.

Achieving carbon neutrality will require a significant reduction in GHG emissions from the building stock. In this regard, a **deep renovation of the existing building stock** is needed. It requires a structured integration of energy-efficient technologies, renewable energy sources, and behavioral change to reduce greenhouse gas emissions and promote sustainability. By employing a multi-faceted framework encompassing policy interventions, financial incentives, stakeholder engagement, and public awareness campaigns, this action aims to transform Limassol into a low-carbon city, setting an example for other coastal cities.

To successfully achieve this goal, it is also imperative to act as an **urban regeneration** by redeveloping, enhancing, and embellishing urban open spaces to promote a more extended use of outdoor spaces and walkability. Solar energy production and natural carbon offsetting through nature-based solutions have to be integrated into open areas to (a) improve microclimate and hence the outdoor thermal comfort perceived by citizens, (b) showcase small local networks of renewable energy production, and (c) improve aesthetics, walking/cycling conditions, by exploring how climate-aware design, energy efficiency, energy management as well as the integration of renewable energy generation in the existing urban fabric result to significant urban energy savings and GHG emissions reduction, through a whole new urban planning that will allow the city of Limassol to grow in a sustainable way.



Presentation of Action 1: Deep building renovation

Also, **constructing new carbon-neutral buildings** promotes climate change adaptation and mitigation strategies. It incorporates energy and resource-efficient design principles, aiming to enhance occupant health, well-being, and productivity while avoiding carbon lock-in risk. Adopting sustainable technologies, improving infrastructure systems, and integrating innovative solutions lay the groundwork for a sustainable and low-carbon built environment, setting the stage for long-term sustainability and environmental impact reduction.

1.9.3 Mobility – Transportation

Mobility and transportation portfolio of actions involves projects that aim to the direct GHG emissions mitigation (e.g., electrification+RE), as well as targets to significant improvements to urban quality of life and public health protection, via reduction of traffic in Lemesos. The portfolio of actions includes:

1. *Implementation of public transportation strategies*

Development of an integrated public transport network (including infrastructure) with multiple modes of transportation, by optimizing the routes to improve efficiency and providing real-time passenger information and ticketing technology, while also establishing multimodal transportation hubs and promoting the implementation of bus prioritization measures.

2. *Strategies enhancing micro-mobility modal split*

Prepare an integrated network of bike lanes and paths for all types of cyclists that integrates micro-mobility solutions such as e-scooters and bike-sharing programs into the transportation network, while also expanding bike parking facilities at key locations throughout the city and collaborating with local businesses and organizations to offer incentives for cycling and micro-mobility use, such as discounts or rewards programs.

3. *Development of comprehensive pedestrian network*

Develop and implement a comprehensive pedestrian network with adequate infrastructure and facilities to ensure safe and convenient access throughout the Municipality, while also prioritizing pedestrian-oriented streetscape improvements, pedestrian-friendly paths and establishing pedestrian zones in key commercial and residential areas.

4. *Establishment of vehicle electrification strategies*

Advance the electrification of private vehicles by increasing Municipality's preparedness via the construction of charging stations in public spaces, commercial centers, and residential areas and implementing smart charging systems to manage peak energy demands using renewable energy sources, while also integrating charging infrastructure in urban planning and collaborate with private companies to install charging stations in their parking lots or garages, while also including the conversion of bus fleet to electric.

5. *Strategies improving the efficiency of freight transportation*

Encourage the use of low-emission vehicles for freight transport but mostly consolidating freight shipments to reduce the number of trips and provision of incentives to private companies to switch to sustainable freight transportation, whilst improving the efficiency of last-mile delivery (e.g., using cargo bikes, electric vans) and implementing a smart logistics system to optimize transport routes and reduce emissions at the Municipal level.

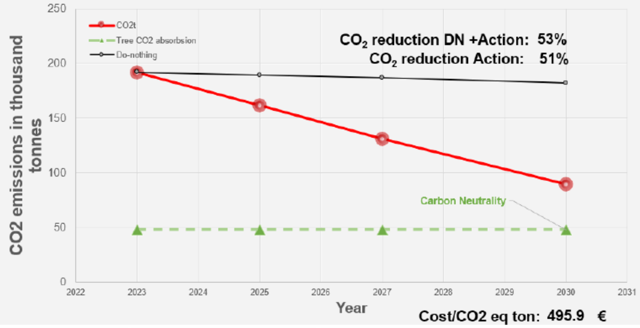
6. *Optimization of transportation demand (TDM strategies)*

Develop a comprehensive transportation demand management plan that implements traffic management strategies that aim to regulate (or restrict) vehicle-access, by disincentivizing private vehicle use through the introduction of parking management schemes, traffic calming measure, while also incentivizing the use of sustainable transportation modes (such as walking, cycling, and shared transportation modes) and developing compact, mixed-use neighborhoods that promote walking and cycling as primary modes of transportation.

7. *Incorporation of smart technologies in sustainable transportation strategies*

Implement actions that use smart technologies. For example, Intelligent Transportation Systems (ITS) to monitor traffic and adjust traffic signals, integrate traffic data with public transportation schedules to improve transit connections and uses ITS to optimize freight logistics and reduce emissions. Also, implement Information and Communication Technologies (ICT) by providing online trip planning tools that include public transportation, bike-sharing, car-sharing, and ride-sharing options, cooperative connected and automated mobility (CCAM) services, mobile payment systems for public transportation and parking and provision of on-demand ride-sharing services for commuters and people with disabilities in order to build a holistic cyber-physical system.

Action 4: Promotion of Vehicle Electrification Strategies



Cost/CO2 eq ton: 495.9 €

Scenarios	Emission Reduction (2030 inputs)	Cost Upfront and Scenario	Cost / CO2 eq ton
Target*	92,385 tCO_2 (-51%)	€4.58m + €41.23m	€496 / CO_2 eq. ton
Fit for 55**	67,828 tCO_2 (-37%)	€2.89m + €25.98m	(extends the scope)

2030 – climate neutrality
***2050 - climate neutrality (55% reductions by 2030)*

Implementation
Stakeholders
Limassol Municipality; Ministry of Transport Communications and Works; Ministry of Energy, Commerce and Industry; Electrical Utility Operators; Citizen's representatives (NGOs)
Legislative changes
Changes in the grid?, Local incentives for investments
Potential Problems
Robust charging infrastructure network requires strategic planning to determine optimal charging locations, considering factors such as accessibility, convenience, and availability of renewable energy sources. Collaboration with energy providers and local authorities is crucial to ensure the timely deployment of charging stations and address any infrastructure gaps. Regular tracking of key performance indicators, such as EV adoption rates, emissions reduction, and infrastructure expansion, will ensure the action's effectiveness.

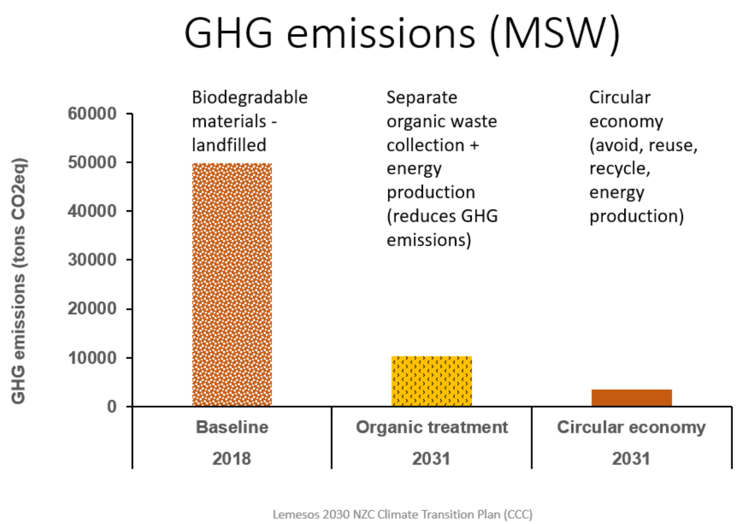
NetZeroCities has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101036519.

Presentation of Action 4: Electrification

1.9.4 Waste

Sustainable municipal solid waste (MSW) management is a challenge for Lemesos municipality, and Cyprus. The country falls behind EU targets that are linked to circular economy. Despite the efforts to improve waste management, a large fraction of organic waste is still landfilled, resulting in increased GHG emissions. In addition, there are still many active dumping grounds which need restoration (and release toxic substances to air, soil and water). Lemesos municipality annual MSW production is estimated to 66539 tons (approx. 11% of the country), from which 54176 tons go to treatment facilities, with the major quantity possibly landfilled, despite the efforts for sustainable treatment (e.g., energy production by RPF - Refuse derived Paper and plastics densified Fuel). An estimated 40% (of 54176 tons) is the organic fraction, which is mainly landfilled. The GHG emissions that are associated to the collection and treatment of MSW are estimated at 49842 tCO_2eq/year, mainly linked to landfill emissions (estimated by the life cycle of a landfill). There is potential to minimize the emissions (and related environmental impacts) by ***Action 1) Waste segregation (in house/in bussiness) to remove organic waste for energy and***

fertilizer production and ***Action 2) Applying Zero waste production (circular economy) principles in Lemesos***. These two actions however are linked to stakeholder and citizen engagement (e.g, insentives, education and training).
For the first action, the target is to separately collect organic waste (e.g., household, restaurants, bakeries) at the household and company levels and divert them in existing energy production facilities (e.g., anaerobic digestion and electricity generation), in proximity to Lemesos. Limassol and Pentakomo treatment plants use anaerobic digesters to process organic waste, generating biogas for energy production. This action will contribute to reducing the emission factor from the landfill, which is among the highest in the EU due to the high organic load. According to our estimations, separate collection of organic waste to produce energy and fertilizer leads to 83% reduction of the GHG emissions related to MSW management in Lemesos. Initials steps (feasibility study) could be also conducted for the design of a waste to energy facility in Lemesos, supporting the existing infrastructure and the national targets for waste management and GHG emissions reduction. The second action capitalizes the outcomes of Action 1, to go one step further to remove all the recyclable materials in the MSW (e.g., plastic, metals, textile, inert). Additional removal of recyclable (biodegratable) material could increase the reduction up to 90%. This will also lead to zeroing the amount of (biodegradable) waste that goes to the landfill. Beyond this, the potential to establish material reusing and recycling facilities in Lemesos will be examined, which supports circular economy and green jobs. As it is, PMD is collected, stored and exported to recycling factories in the EU (which increases GHG emisisons due to shipping transportation) or burned (e.g., plastic, glass, metals) for electricity production (which has environmental impacts). Based on the implementation of the circular economy principles (e.g., avoid, reuse, reduce, recycle, “pay as you throw”, household sorting) the municipality has the opportunity to educate residents about the benefits of waste separation and employ smart systems for monitoring. One option is to use RFID or barcode technology, where tags on waste bins record collection events and transmit data to a central database. This enables precise tracking and measurement, crucial for charging residents or businesses based on their waste production. The implementation of the 2 actions also contributes to green jobs creation, related to sustainable solid waste management. Co-benefits are related to human health, city aesthetics and environmental protection.



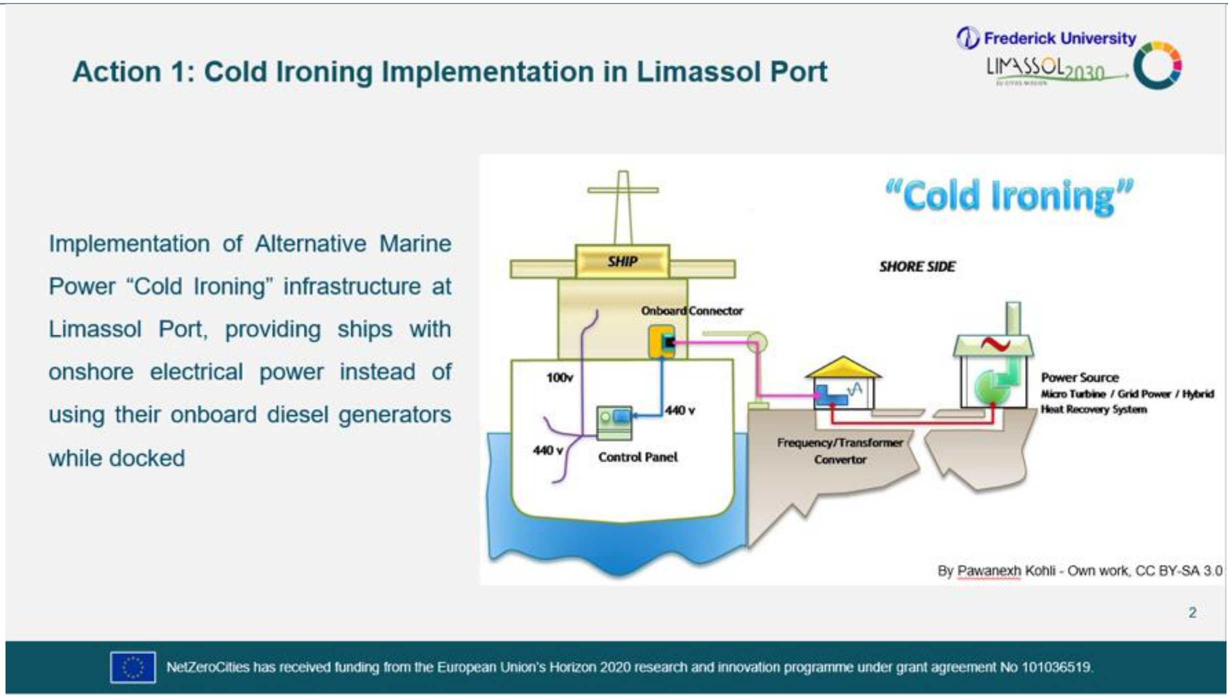
Reduction in GHG emission due to the actions related to circular economy.

1.9.5 Coastal and Port

Coastal port cities such as Limassol, are particularly sensitive to CO_2 emissions due to multiple cumulative pressures exerted by complex anthropogenic activities related to the urban centre and maritime operations.
The portfolio of actions proposed for this thematic address these environmental challenges through collective and systemic intervention to adapt to climate change, for the benefit of the city and to comply with the international environmental regulatory framework.
The proposals cover activities either on the coastal front, on land (urban coastal area), or purely maritime related activities (port and marina operations), including the marine ecosystem and its potential to function as a carbon sink of the city. Actions associated with adaptation to climatic change and energy consumption are to be associated closely to public information campaigns change management programmes aiming at shifting energy consuming public behaviour.
To summarise, the proposals cover the following:

- The Cold Ironing initiative at Limassol Port provides a method for shore-side electrical power to docked ships, minimising the need for onboard diesel generators and thereby cutting emissions and improving air quality. Supported by various EU policies and offering financial incentives, the action promises significant environmental, economic, and employment benefits aligning with international sustainability goals;
- Environmental adaptation of the complex “blue infrastructure” of the Limassol Marina, including infrastructure on the coastal front (buildings) and at Sea;
- Use of technology to improve maritime surveillance and environmental monitoring to mitigate marine environmental risks and protect the marine ecosystem;
- Utilize the capacity of seagrass meadows to capture and lock carbon;
- Test and implement concepts such as the ’15 minutes city’ and the ‘healthy neighbourhood’, tailored to the very different cultural and climatic context of the city to develop costal resilient neighbourhoods; Explore ideas on the nature of a sustainable slow moving / activity based, / passive climatic design informed, linear coastal transport corridor;
- Exploitation of wave energy for water desalination towards reduction of CO2 emissions from conventional desalination systems.

Collectively, the thematic proposals present a coherent and unified set of actions, aimed at protecting coastal communities and reducing the impacts of CO2 emissions on the marine environment and human health. Integrating the “Coastal and Maritime Zone” thematic proposals into the Limassol Municipality Climate Contract delivers a cohesive approach to achieve the 2030 objectives for a climate neutral and smart city, promoting sustainable development, coastal resilience and environmental protection and improving the quality of life of residents.
The development of all proposed actions of the coastal and sea thematic involved the active participation of all relevant stakeholders such as the Cyprus Ports Authority (CPA) and port terminal operators (private organizations), Electricity Authority of Cyprus (Cold Ironing), the management of Limassol Marina, relevant authorities for the coastal environment monitoring and protection and, of course, the citizens. This engagement is of vital importance and will therefore continue to exist and develop through workshops, focus groups meetings and the Blue Limassol Forum (https://www.limassol.org.cy/el/bluelimassolforum). The engagement of Limassol community stakeholders is also witnessed by the first holistic environmental risk assessment of Limassol coastal area (https://www.limassol.org.cy/en/blue-limassol-forum-2022-research).



Action 1 – "Cold ironing" implementation in Lemesos port.

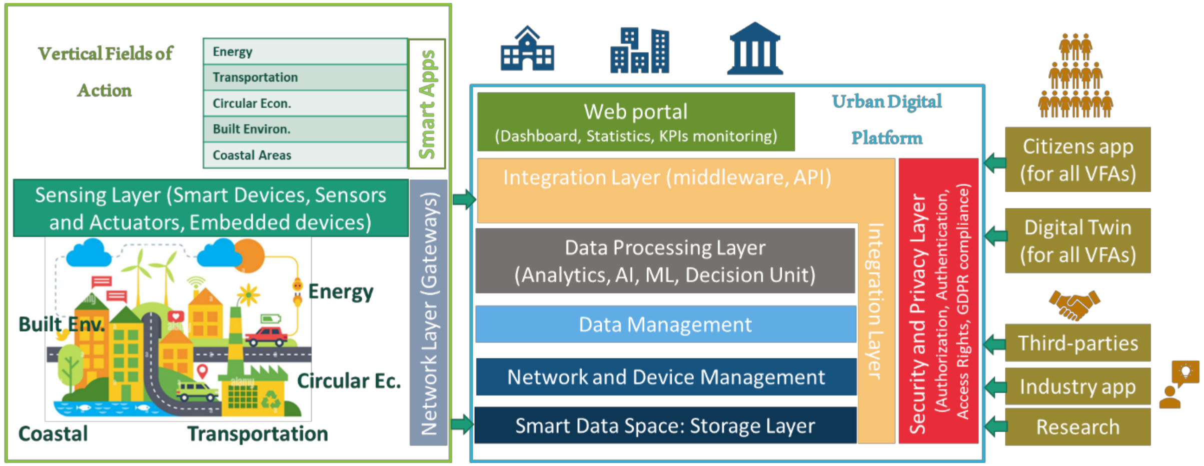
1.9.6 Smart city (horizontal) actions

Digital support activities are typically included in each thematic area. However, some additional such activities are:

Smart Transformation – Horizontal Field of Action

Smart and Digital Transformation can play a significant role in carbon emission reduction by allowing ICT infrastructure modernization, reskilling employees and being remote ready, implementing automations and real-time data monitoring and analysis, as well as making informed decisions by using AI-insights. More specifically, the modernization of the ICT infrastructure and by replacing the existing electronic devices (such as laptops and PCs) with energy-efficient equipment can significantly reduce the carbon emissions of an enterprise, a governmental organization and/or a municipality. Moreover, as Microsoft report has recently shown the shift of operations to the cloud result in significant energy and carbon emission reduction potential compared to on-premises data-centres, which this can be up to 93% more energy-efficient and as high as 98% more carbon-efficient due to their extensive IT efficiency investments as well

as renewable energy. Google research also revealed that moving commonly used software applications to the cloud would decrease energy use by up to 87%. Cloud computing also enables home and remote work, reducing the need to commute and indirectly reducing transportation emissions.
Additionally, the incorporation of real-time monitoring and analysis of data, resources and device deployment management as well as the incorporation of Artificial Intelligence for automations and informed decision making, predictive maintenance and risk assessment may result in a more optimized energy usage, resources utilization, early identification of emission hotspots and carbon intensive activities. The ubiquitous smartphone devices may also empower citizens and communities by providing early warnings, real-time notifications and results on their energy usage and carbon footprint raising in this way awareness and encouraging behavioural change. Lastly by allowing a seamless integration to all municipality services and data will embrace trustworthiness and will attract private investors to develop more and new smart apps and deployments and consequently further enhance the smart transformation of Limassol city.



The *Smart Transformation* horizontal field of action will mainly provide support to the vertical horizontal areas by implementing the following actions: A1. Digital Transformation - Green IT through equipment modernization, switching to the cloud and re-skilling employees and be remote-ready. A2. Urban Digital Platform composed of six layers (Smart Infrastructure Management, Data Space, Security and Privacy, Urban Digital Platform Web-based Portal, Limassol citizens smartphone application, Integration middleware), A3. Smart Apps & Intelligent Modules and solutions based on the needs identified by the vertical fields of action, A4. Limassol Digital Twin by designing and developing a virtual replica of the Limassol city.

2 Work Process

This section should list the working steps carried out, for example along the NZC Climate Transition Map, or related steps planned as well as outline timeline and milestones for future iterations for the continuous development of the Action Plan.

Work Process - combination of textual and visual elements
2.1. Work process 1. NZC Mission EoI (January 2022) Lemesos Municipality (L.M.) embarked on a transformative journey by expressing its keen interest in formalizing and integrating its commitment to sustainability and the UN Sustainable Development Goals (SDGs). Prior to this, the city had pursued sustainability through various studies and rather disconnected environmental protection policies, plans, and projects. This expression of interest marked a pivotal moment in channeling the city's economic development towards a more sustainable future. 2. Lemesos accepted in NZC Mission (April 2022) By April 2022, L.M.'s application was accepted, setting in motion the city's focused efforts to enhance its Municipal Capacity Building, with a specific emphasis on climate resilience and the following results and plans. 3. Establishment and operation of the internal Transition Team (May 2022 - today) The city established a Climate Transition Team from various municipal departments, the Mayor and city counselors, and the Cyprus Institute (CyI) as the city scientific advisor to lead and coordinate its climate sustainability activities. This team plays a crucial role in coordinating and guiding L.M. towards its climate resilience goals. L.M. entered into a collaboration agreement with the Cyprus Institute (CyI), a significant step towards forging partnerships and leveraging scientific expertise in the pursuit of sustainability. 4. Engagement with Stakeholders and Citizens (June 2022 – today) L.M. recognized the importance of involving stakeholders and citizens in the sustainability journey. Effective communication and meetings have been held to garner input, feedback, and support from the community. 5. Pilot Project Application (September-November 2022)

In the latter part of 2022, a pilot project application brought together various stakeholders, including the municipality, CyI, Cyprus University of Technology (CUT), ETEK, and Friends of the Earth (FoE). This collaborative effort aimed to develop a proposal that highlighted the essential components needed to establish the Climate Change Committee (CCC).

6. Formation of Thematic Teams and collaboration agreements (February 2023)

In February 2023, thematic teams were formed, marking a critical step in the structured approach towards sustainability. These teams would focus on specific areas crucial for achieving sustainability goals.

Public thematic workshops were conducted, involving stakeholders and citizens. These workshops provided a platform for collaborative discussions and idea-sharing, further strengthening the city's sustainability framework.

7. City Advisor's Visit and Presentation to City Council (March 2023)

In March 2023, the City Advisor Project Week played a pivotal role in refining the city's sustainability strategies.
A week-long visit by the City Advisor provided valuable insights and expertise. It included discussions with the Mayor, city counselors, and Municipality staff, the thematic teams as well as online meetings with other Mission staff. Following this, a presentation was made to the City Council followed by a discussion to gain support and approval for the climate initiatives.

8. Central government support (April 2023)

In April 2023, a conference was held to garner support from Cyprus Republic leadership, including the President of Cyprus, who publicly declared his support for Lemesos Mission, followed up by a decision to include it as a separate chapter in the National Energy and Climate plan.

9. Success of the Lc3 pilot project – Bootcamp – Kickoff (April – September 2023)

During this time, the Lc3 proposal was deemed successful, signifying progress towards sustainable practices. The ‘bootcamp’ process was very useful for the whole project team.
The grant agreement was signed in July (official start of the project June 1) with an online kickoff in July, σ in-person kickoff in September.

10. Milano Summer School (June 2023)

Two members of the Transition team attended the Milano summer school, very useful for drawing up the CCC.

11. Commitments document and Action Plan version 1 (30 June 2023)

The first version of the Action Plan and commitments document were developed by the thematic teams in cooperation with Municipality staff, City political leadership, stakeholders and citizens through workhops.

12. Cyprus Network of NZC Cities: (July 2023)

L.M. established the Cyprus Network of Net-Zero Carbon (NZC) Cities, establishing its place within a broader sustainability network. On July 6, 2023 the memorandum was signed by the Municipalities of Lemesos, Strovolos, Paphos, and Aradippou. The Network is open to participation of other cities; municipalities in the greater Lemesos area are of particular importance since most of the activities in the Transition action portfolios are naturally extended to them. The network will be a focused tool for testing and applying transferability.

13. Open Workshops and Investment Plan: (July-August 2023)

In July 2023, open workshops engaged city council members, municipality employees, and stakeholders in discussions about the Action Plan. This collaborative effort paved the way for the development of an Investment Plan in August 2023, which involved thematic teams and the CCC coordination team.

14. CCC Adoption and Signing: September 2023

September 2023 marked a significant milestone as the city's mayor, city council, and central government formally adopted and signed the Climate Change Committee (CCC), cementing their commitment to sustainability.

15. Lc3 Activities accelerate (September 2023 – May 2025)

Lc3 accelerates L.M. capacity building; participatory co-design solution workshops for the built environment
LM Transition team with full-timers; regulatory sandbox; Lemesos Commons operation

16. Transition Projects Stage I (Oct 15, 2023 – Oct 15, 2026)

See Appendix I of Action Plan for projects, short descriptions, budgets, and timelines.

17. CCC version 2, March 2024 and version 2.1, September 2024

Public consultation through co-workshops of CCC version 1
Development of CCC version 1
February-March 2024: inclusion of Mission feedback from CCC v1 into v2
March 15 2024: Submission of CCC v2

The period from October 2023 to March 2024 an acceleration in Lc3's efforts will take place, including the expansion of the Transition Team and intensification of Municipal Capacity Building. LM Transition team with full-timers. This phase involves extensive public consultation through co-workshops, that will lead to the development of the second version of the CCC. Feedback from CCC v1 will be incorporated, and by March 15, 2024, the CCC v2 will be submitted.

This cycle of progress will be repeated in September 2024.

18. Next CCC versions

We plan to establish a CCC MEL mechanism which will:

(1) Create a detailed (civil-engineering project-like) plan
(2) Record progress, delays, mistakes, and good practices
(3) Produce a minor CCC revision every September and a major revision every March (until March 2031 which will conclude the 2022 – 2030 Lemesos Climate Transition)

Additionally, we will follow the strategy presented in 2.2.2 (below) for updating the AP.

2.2. Action Plan development methodology

The first analysis of the current situation was done based on thematic areas of emission production. In addition to the standard ones (Energy, Built Environment, Transportation, and Waste) it was important for Lemesos to add the Port and the Coastal area[1]. This analysis initially undertaken by expert teams[2] started with discussions with the relevant stakeholders in special workshops and then in co-design workshops with the City Council, the Municipality Administration, and the public. It resulted in about 24 broad mitigation Actions presented in the CCC template tables that follow; they will be implemented via several hundred projects such as the LC[3] mission pilot, installation of electric cars charging stations, park (trans)formations and other microclimate interventions, participatory stakeholder co-design workshops, training for new green jobs, a variety of social innovation projects, a series of building deep retrofitting projects, an organic waste treatment factory, minimize solid waste that goes to the landfill (household shortening, pay as you throw), green energy communities, land and sea carbon absorption NBS, and a tram line. (A concrete list of projects for 2023-26 is in Appendix I.) The thematic teams worked in weekly coordination meetings (to avoid silo mentality) along with a CCC coordination team by L.M. and the CyI with political supervision from the City Council, scientific from the Cy.I., and organizational from the L.M. Transition Team.

[1] The Port resembles an industrial operation, not only for the activities taking place on shore but also because moored ships use their diesel engines to produce electricity for their own use thus producing a lot of GHG emissions. The coastal area includes a narrow corridor of both land and sea and presents special opportunities, and challenges while sea breeze is a main factor defining the local Lemesos City microclimate.
[2] L.M. concluded cos
llaboration agreements with the Cyprus Institute, Frederick University, the University of Cyprus and the Cyprus University of Technology to lead six thematic teams. It also commissioned the Cyprus Energy Office to assist with the emissions baseline update and Deloite Limassol to assist with the investment plan.

2.2.1 Structure

We thus have four levels of detail for the Action Plan (see Table 1):

- The whole Transition
- The six Thematic Areas
- The 5-7 Actions of each area and
- The hundreds of implementation projects

Table 1. Lemesos NZC Transition: Six Thematic Areas, 30 (broad) Actions, examples hundreeds of implementation projects (Appendix I)

Energy	Built Environment	Transport/Mobility
EA_0: Change Electricity Mix EA_1: PV Park & Energy Community EA_2: Fresnel System EA_3: Residential RE with storage EA_4: Heat Pumps-residential EA_5: RES generation and long-term storage	BA_1: Deep renovation BA_2: New carbon-neutral buildings BA_3: Urban regeneration	TA_1: Public transportation strategies TA_2: Micro-mobility modal split TA_3: Comprehensive Pedestrian Network TA_4: Vehicle Electrification TA_5: Improving Efficiency of Freight Transportation TA_6: TDM Strategies TA_7: Smart Technologies in Sustainable Transportation
Coastal & the Port	**Waste / Circular**	**Horizontal/digital**
CA_1: Cold Ironing in the Limassol Port CA_2: Limassol Marina energy community CA_3: MERA CA_4: RECONE CA_5: Seagrass meadows in Limassol-carbon sinking and meadow restoration CA_6: Wave energy production	WA_1: Removal of organic waste for energy and fertilizer production WA_2: Zero waste production	A1. Digital Transformation - Green IT A2. Urban Digital Platform A3. Smart Apps & Intelligent Modules and solutions A4. Limassol Digital Twin

To translate Actions into prioritized implementation Projects we used the guiding principles (Section 2.3), focus areas (Section 2.4) and project selection criteria (Section 4.1). Most projects and many actions benefit from the expertise and considerations of more than one thematic area.

2.2.2 Strategy to update the Action Plan
The strategy below outlines the steps to review, revise, provide future iterations of the AP.

Review and Revise: Reflect initial action plan and identify areas that need adjustment. Consider changes in resources and/or priorities.
Prioritize Actions: Determine which actions are most critical to achieving AP objectives. Allocate resources, time, and effort accordingly.
Set New Milestones: Establish new, updated milestones that align with the revised action plan. Ensure these milestones are specific and have deadlines.
Communicate Changes: Inform all relevant stakeholders about the updated plan. Clearly articulate the reasons for changes and how they impact the overall strategy (MEL).
Monitor Progress: Implement a system for tracking progress towards goals. Regularly review performance against milestones and KPIs.
Adjust as Necessary: Make further updates and adjustments as new information or challenges arise. Adapt the plan to stay aligned with goals and objectives.
Flexibility: Open to new ideas, unexpected opportunities, or necessary course corrections.
Document Everything: Maintain clear records of the action plan, revisions, and progress. Documentation facilitates accountability and future reference.
Periodic Reviews: Schedule regular reviews (e.g., six months) of your the Action Plan, not just when issues arise. Monthly, quarterly, or annual assessments, depending on the nature of the goals (actions/activities/projects).
MEL: Continuously learn from experiences, whether they result in success or setbacks. This knowledge is applied to refine strategies for future planning.
Stay Committed, positive and resilient: Maintain a positive attitude and resilience in the face of setbacks. Focus on solutions rather than dwelling on problems.

3 Part A – Current State of Climate Action

Part A "Current State of Climate Action" describes the point of departure of the city towards climate neutrality, including commitments and strategies of key local businesses, and informs the subsequent modules and the outlined pathways to accelerated climate action.

3.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

Module A-1 "Greenhouse Gas Emissions Baseline Inventory" should detail and describe the city's latest GHG inventory to establish the emission baseline and to establish the emissions gap to 2030 climate neutrality according to the inventory specifications defined in the Cities Mission's *Info Kit for Cities* and the process outlined in the Action Plan Guidance.

A-1.1: Final energy use by source sectors	
Base year	2018

Unit	MWh/year			
	Scope 1	Scope 2	Scope 3	Total
Buildings	**325,307**	**390,626**	**0**	**715,933**
Electricity		390,626		**390,626**
Heating Diesel	83,411			**83,411**
Kerosene	12,031			**12,031**
LPG	58,614			**58,614**
Biomass	28,230			**28,230**
Charcoal	10,907			**10,907**
Solar Thermal	132,114			**132,114**
Public Lighting	**0**	**5,257**	**0**	**5,257**
Electricity		5,257		5,257
Transport	**772,421**	**0**	**0**	**772,421**
Diesel	425,658			425,658
Gasoline	326,002			326,002
Biofuel	20,762			20,762
Waste	**0**	**0**	**0**	**0**
Industrial Process and Product Use (IPPU)	**22,395**	**56,786**	**0**	**79,181**
Electricity		56,786		**56,786**
Heating Diesel	12,126			**12,126**
Kerosene	1,749			**1,749**
LPG	8,521			**8,521**
Agricultural, Forestry and Land Use (AFOLU)	**662**	**1,678**	**0**	**2,340**
Electricity		1,678		**1,678**
Heating Diesel	358			**358**
Kerosene	52			**52**
LPG	252			**252**

A-1.2: Emission factors applied

(please specify for primary energy type and GHG emission factor according to methodology used)

The GHG emission factors shown in the first column are expressed in CO2 equivalent and figures for all fuels were derived from our national energy legislation. Specifically, the emission factor used for electricity for Cyprus was taken from a JRC study and refers to the baseline year of 2009. The data sources used by our external consultant who produced the baseline emissions inventory do not disaggregate gasses, but provide figures in CO2eq. directly (and hence embody the warming potential of CH4, NOx etc.). Unfortunately at the moment we have no no way of disaggregating these numbers, and therefore columns have been left blank. For the moment no data is available regarding localised emissions factors and therefore these figures are national.

The emissions factor for electricity in the national grid which we expect to have in 2030 can be taken from the latest NECP of Cyprus that forecasts a system that has an emissions factor of 0.285 tCO2/MWh, please see below.

The specific electricity mix can be provided if needed, but indicatively it assumes converting all Fossil-based energy generation from diesel and HFU to Natural Gas, as well as very generous expansion of RES, especially PV. The transition also assumes the construction of an electricity interconnector between Greece, Cyprus and Israel that will allow deeper penetration of RES without the need for big amounts of storage. Not realising several changes (such as upgrading the grid, deploying storage, building the interconnector and not switching to NG) will have negative impact on this factor. Quantifying the riisks at this point is difficult, as several factors are at play, but since the NECP is the official relevant strategy, we feel fairly confident that these changes will occur.

Primary energy/ energy source	Carbon Dioxide (CO_2)	Methane (CH_4)	Nitrous Oxide (N_2O)	F-gases (hydrofluorocarbons and perfluorocarbons)	Sulphur hexafluoride (SF_6)	Nitrogen trifluoride (NF_3)
Electricity	0.874	N/A	N/A	N/A	N/A	N/A
Heating Diesel	0.267	N/A	N/A	N/A	N/A	N/A
Kerosene	0.259	N/A	N/A	N/A	N/A	N/A
LPG	0.227	N/A	N/A	N/A	N/A	N/A
Diesel	0.267	N/A	N/A	N/A	N/A	N/A
Gasoline	0.249	N/A	N/A	N/A	N/A	N/A
Charcoal	0.403	N/A	N/A	N/A	N/A	N/A

A-1.3: Activity by source sectors

Base year		2018 (Unit : MWh/year)	
	Scope 1	**Scope 2**	**Scope 3**
Buildings	**325,307**	**390,626**	**0**
Space heating	247,233	39,063	0
Space cooling	0	70,313	0
Water heating	16,265	23,438	0
Cooking	61,809	35,156	0
Electrical appliances & lighting	0	222,656	0
Public Lighting	**0**	**5,257**	**0**
Public Lighting - Urban areas	0	4,418	0
Public Lighting - Rural areas	0	0	0
Public Lighting - Traffic Lights	0	343	0
Public Lighting - Other Lighting	0	496	0
Transport	**772,421**	0	0
Urban and suburban passenger road land transport	750,615	0	0
Other passenger road transport services (taxi, tourism, school buses, etc.)	21,806	0	0
Industrial Process and Product Use (IPPU)	**22,395**	**56,786**	**0**
Manufacturing	21,520	54,565	0
Electricity, Gas, Steam and Air Conditioning Supply	79	200	0
Water Supply; Sewerage, Waste Manag. and Remediation Act.	426	1,080	0
Construction	371	941	0
Agricultural, Forestry and Land Use (AFOLU)	**662**	**1678**	**-**
Agriculture, Forestry, Fishing	662	1678	

A-1.4: GHG emissions by source sectors

Base year	2018			
Unit	tCO2equivalent/year			
	Scope 1	Scope 2	Scope 3	Total
Buildings	43,075	341,407		380,199
Public lighting		4,594		4,594
Transport	194,825			194,825
Waste			82,958	82,958
Industrial Process and Product Use (IPPU)	5,623	49,631		55,380
Agricultural, Forestry and Land Use (AFOLU)	166	1,467		4,594
Carbon sinks	-1,020			-1020
Total	**242,669**	**397,099**	**82,958**	721,530

A-1.5: Graphics and charts

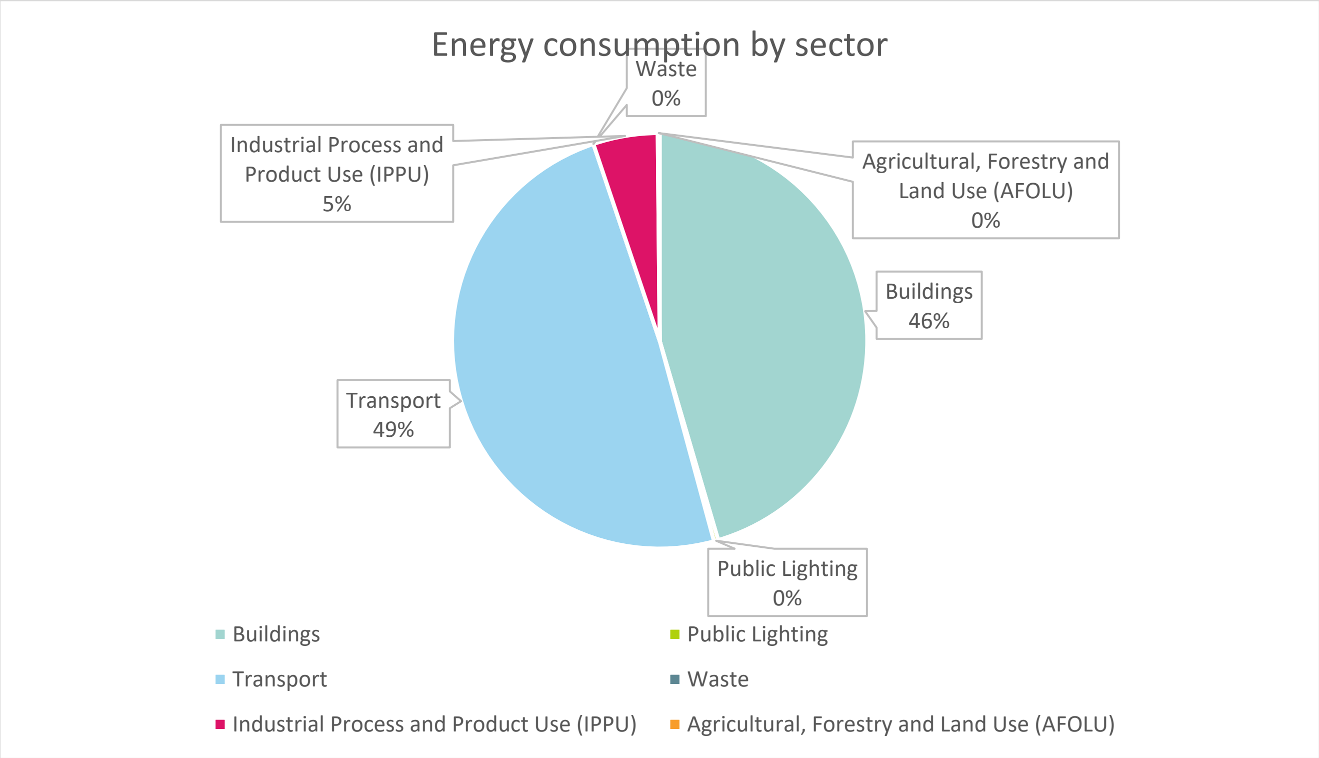


Figure 1. Energy consumption by sector for the base year 2018

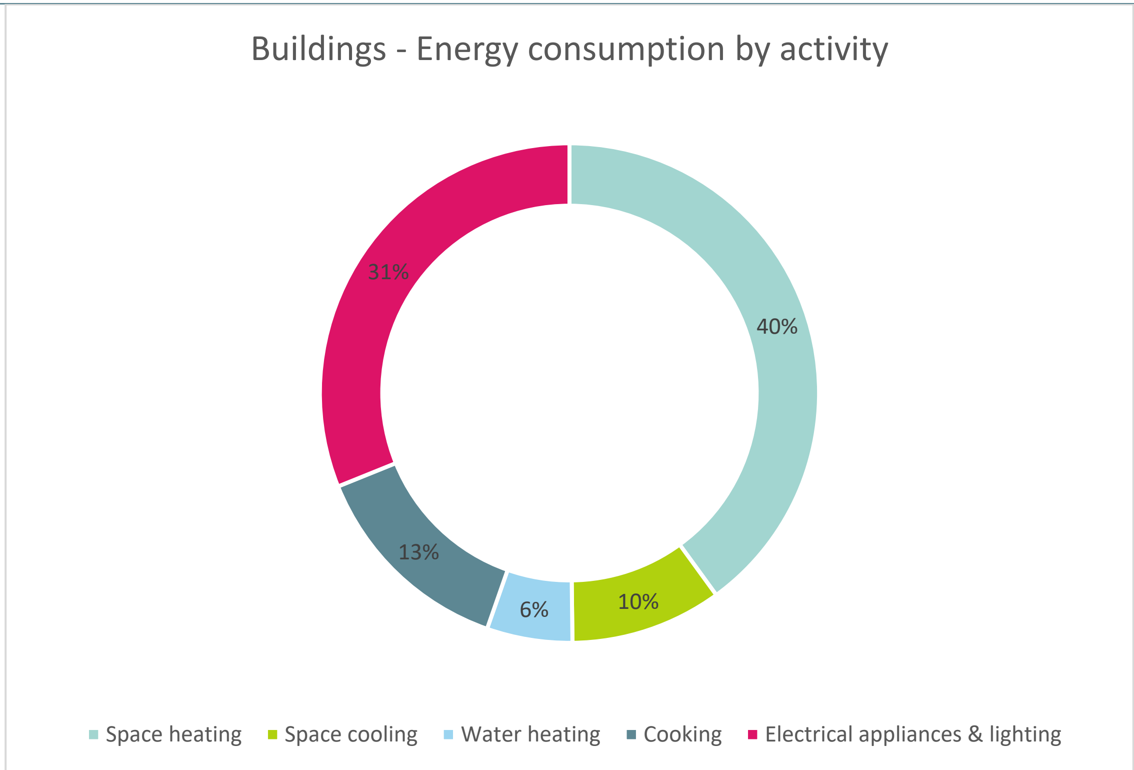


Figure 2. Energy consumption by activity for the buidling sector for the year 2018

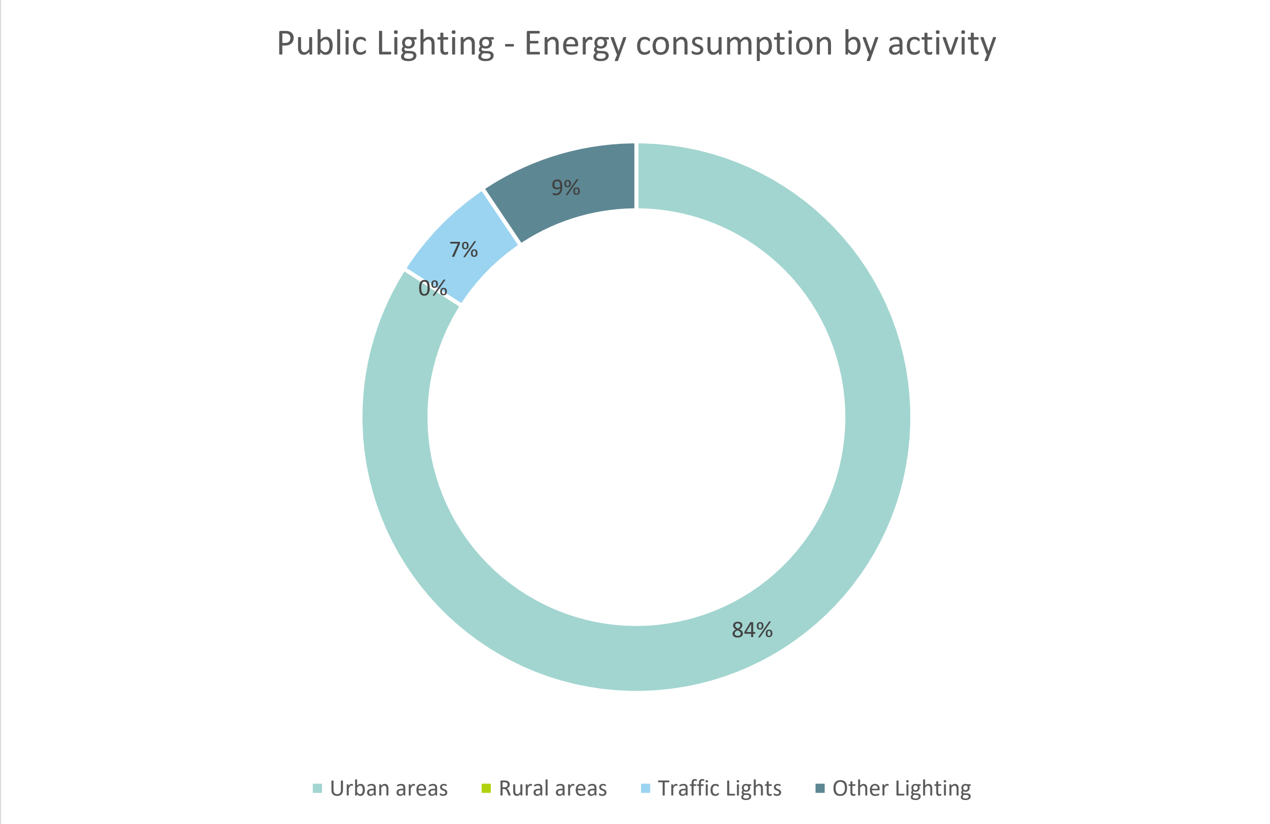


Figure 3. Energy consumption by activity for the public lighting sector for the year 2018

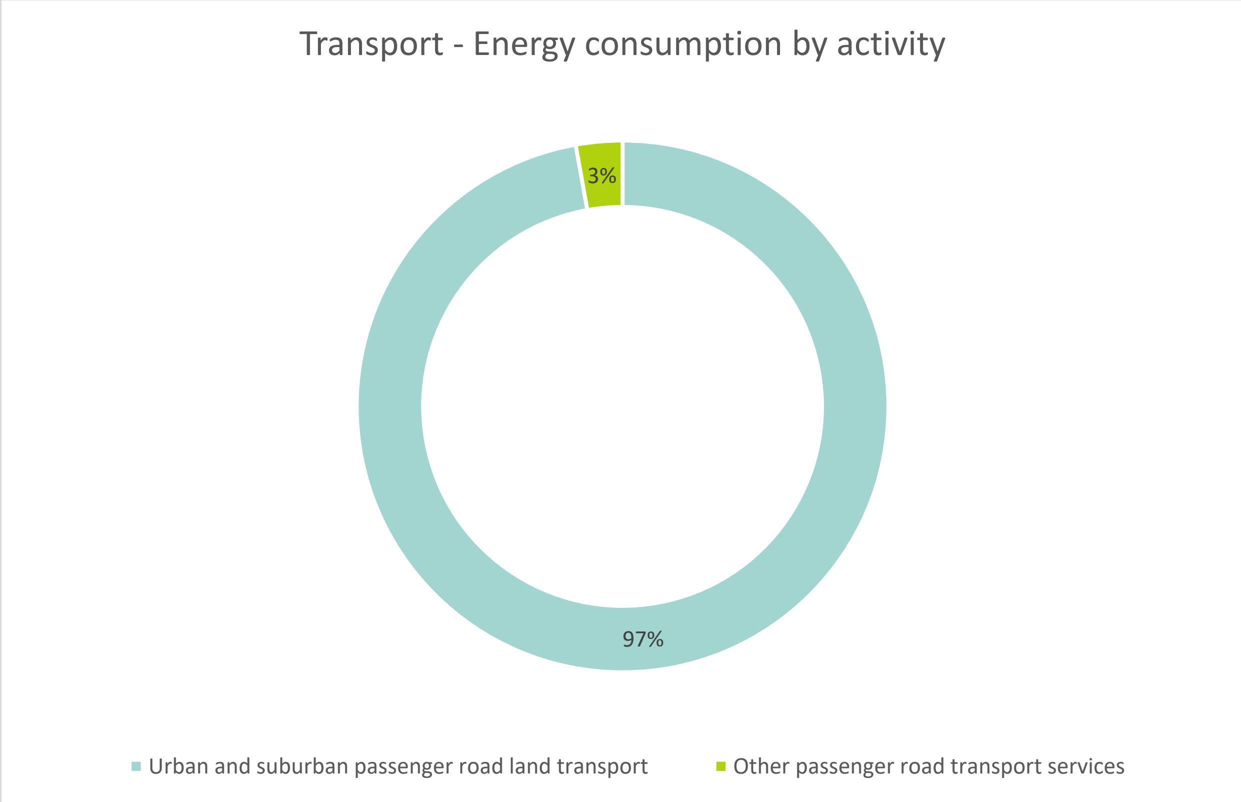


Figure 4. Energy consumption by activity for the transportation sector for the year 2018

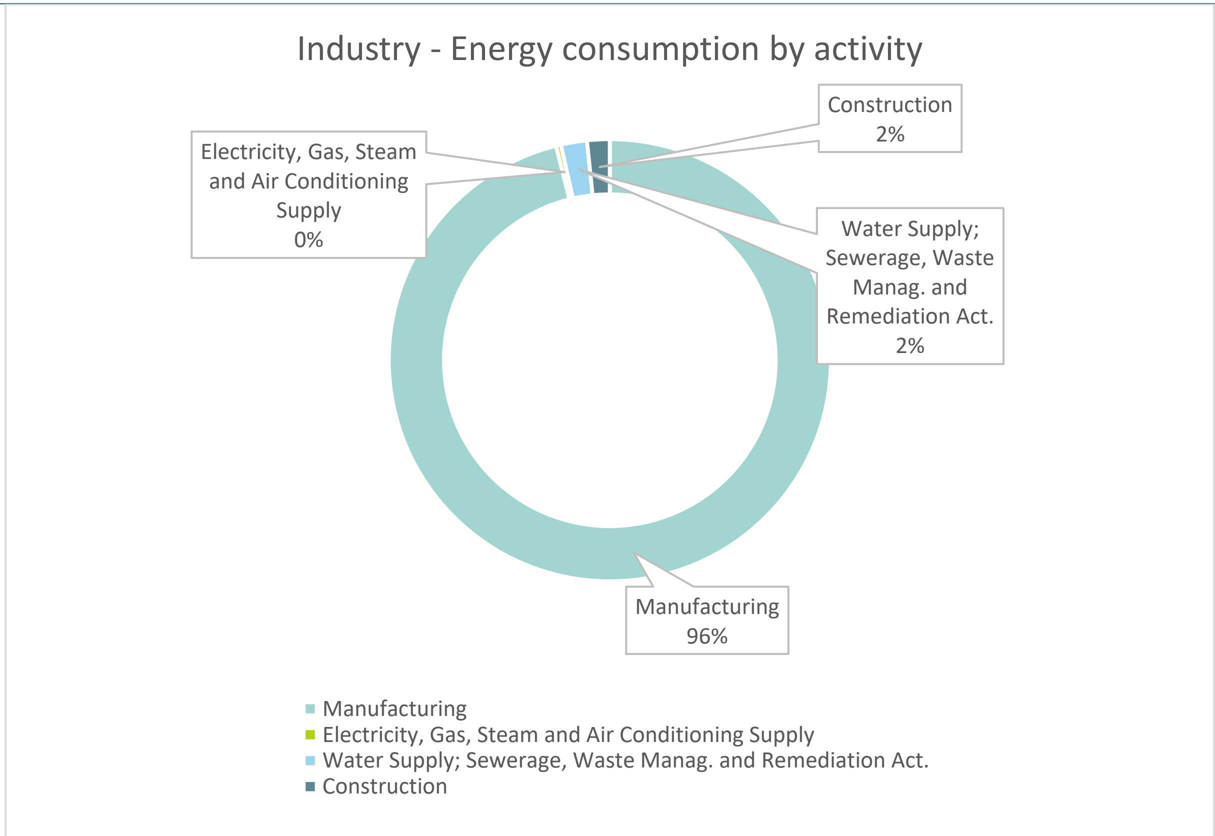


Figure 5. Energy consumption by activity for the industry sector for the year 2018

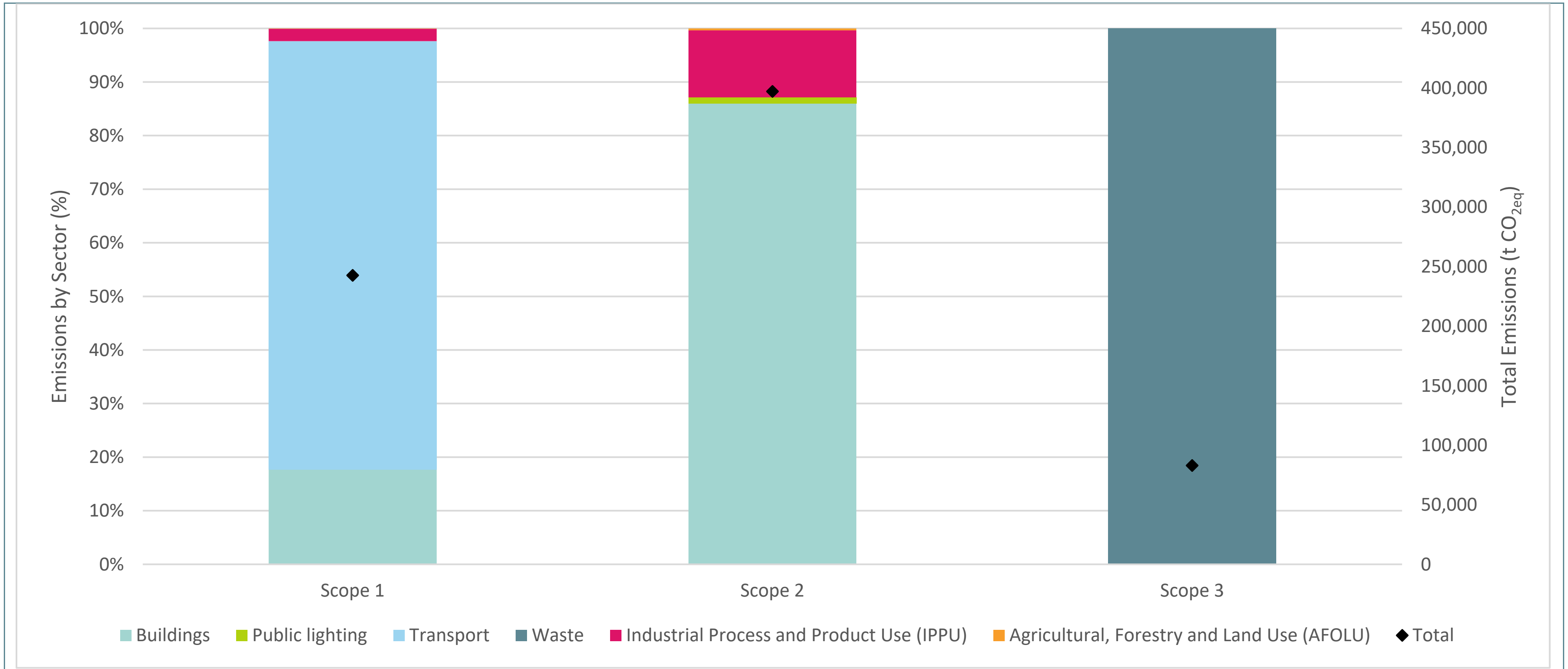


Figure 6. Breakdown of emissions by sector and Scope for the base year 2018

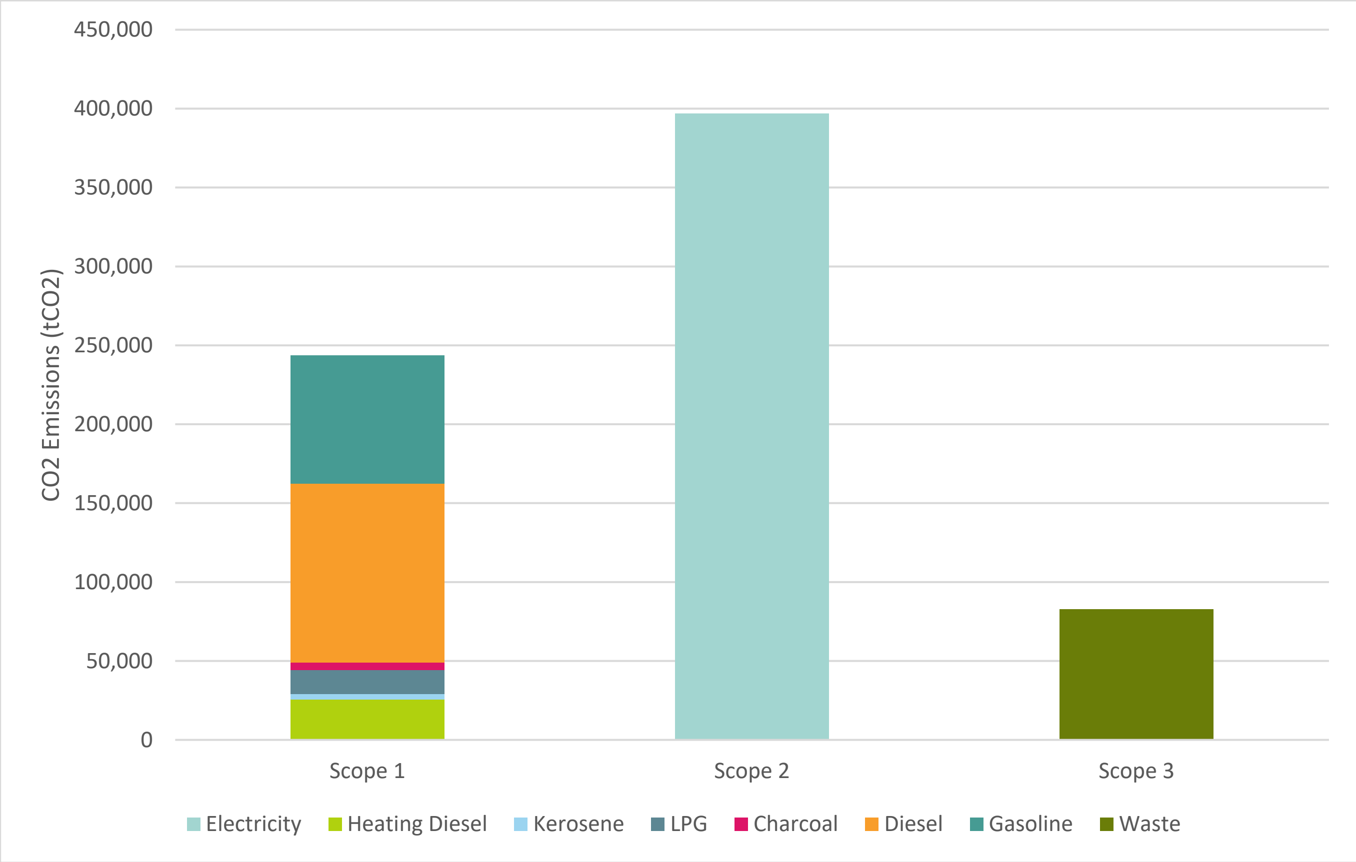


Figure 7. Breakdown of emissions by fuel and scope for the base year 2018

A-1.6: Description and assessment of GHG baseline inventory

The BEI covers emissions from buildings, public lighting, industry, transport, waste, and AFOLU.
Scope 1 emissions refer to those generated within the boundaries of the city, scope 2 is comprised entirely from electricity as there is no district heating infrastructure in place, and scope 3 is the smallest, however it only accounts for one sector, waste. Scope 2 is the largest contributor in emissions for Lemesos at 55% of the total for 2018.

In terms of electricity consumption, the residential sector is the highest, with more than double the consumption compared to the second highest sector (trade). With national trends of urbanisation in mind and given that there is still undeveloped residential plots, this sector is expected to increase in consumption.

Emissions have reduced slightly from the baseline year (2018) until 2020, however this reduction is mainly in transport and can be attributed to the pandemic, thus it is expected to bounce back. Carbon sinks have remained stable in the past few years and offset only 0.1% of the annual emissions of the municipality. Green electricity (solar) to grid has a slight decrease in the past years, however this does not include self-consumption and residential net-metering. There is not clear data on how much this amount of produced electricity accounts to the total, yet the national trend is increasing.

Methodology: The baseline has been created using the actual electricity consumption within the boundaries of the municiapility, divided in sectors of economic activity Using national data on other sources of energy and with weighted averages, an estimation on the use of the remaining fuels has been made. In terms of waste, the municipality collects information on the weight of MSW produced each year. Based on information from both the municipality and national level, we are able to estimate the emissions produced from waste management. For calculating AFOLU emissions/sequestration, a combination of satellite imaging and municipal data on new building developments were used. The emissiosn factor for electricity is takne from JRC with data from 2009, Overall, the methodology used is a combination of JRC and UNFCCC guidelines and is an approximation, as neither local, nor national data is available for the capability of sequestration of local flora. Data on industry was collected as described above and also through discussions with local industry.

3.2 Module A-2 Current Policies and Strategies Assessment

Module A-2 “Current Policies and Strategies” should list relevant policies, strategies, initiatives or regulation from local, regional and national level, relevant to the city’s climate neutrality transition.

A-2.1: List of relevant policies, strategies & regulations

(International) Policy: UN Sustainable Development Goals

Description: The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand

with strategies that improve health and education, reduce inequality, and spur economic growth **– all while tackling climate change and working to preserve our oceans and forests.**
Relevance: Goal 7 (Affordable and Clean Energy), Goal 11 (Sustainable cities and communities), Goal 13 (Climate Action) are directly related to the Net-Zero mission. A number of other goals are indirectly related or interconnected with the planned actions.
Need for action:
(International) Policy Initiative: Local Agenda 21
Description: Local Agenda 21 (LA21) is a policy initiative aimed at encouraging local authorities to promote more environmentally, socially and economically sustainable communities.
Relevance: Relevant to the sustainable development of the build environment
Need for action:
(EU) Policy: European Green Deal
Description: The European Green Deal is a package of policy initiatives, which aims to set the EU on the path to a green transition, with the ultimate goal of reaching climate neutrality by 2050. It underlines the need for a holistic and cross-sectoral approach in which all relevant policy areas contribute to the ultimate climate-related goal. The package includes initiatives covering the climate, the environment, energy, transport, industry, agriculture and sustainable finance – all of which are strongly interlinked.
Relevance: EDG is expected to be the driver for 1. a climate neutral and sustainable EU, 2. The transition to a climate neutral Europe by 2050, 3. The reduction of energy dependence and shift to renewable energy sources
Need for action:
(EU) Policy: EU Cohesion Policy 21-27
Description: Strengthening economic, social and territorial cohesion in the EU. It aims to correct imbalances between countries and regions. It delivers on the Union's political priorities, especially the green and digital transition.
Relevance: Under this policy, Cyprus receives funding from the European Regional Development Fund (ERDF), the Cohesion Fund (CF) and the Just Transition Fund (JTF) which may be channeled towards the objectives and actions of the CCC (see investnement plan)
Need for action:
(EU) Policy: Climate Target Plan 2030
Description: With the 2030 Climate Target Plan, the Commission proposed to raise the EU's ambition on reducing GHG emissions to at least 55% below 1990 levels by 2030. This is a substantial increase compared to the existing target upwards from the previous target of at least 40%
Relevance: 1. Set a more ambitious and cost-effective path to achieving climate neutrality by 2050, 2. Stimulate the creation of green jobs and continue the EU's track record of cutting greenhouse gas emissions whilst growing its economy, 3. Encourage international partners to increase their ambition to limit the rise in global temperature to 1.5°C and avoid the most severe consequences of climate change
Need for action:

(EU) Legislative proposals: Fit for 55
Description: The package of proposals aims to modernize existing legislation in line with the EU's 2030 climate target and introduce new policy measures to help bring about the transformative changes needed in the economy, society and industry to achieve climate neutrality by 2050 and to support it, reduce net emissions by at least 55% (compared to 1990) by 2030.
Relevance: Driver for actions proposed
Need for action:
(EU) Initiative: New European Bauhaus
Description: Creative and interdisciplinary initiative linking the European Green Deal with living spaces
Relevance: 1. Bridge the world of science and technology, and art and culture. 2. Leverage on our green and digital challenges to transform our lives for the better. 3. Address complex societal problems together through co-creation.
Need for action:
(EU) Initiative: New European Urban Mobility Framework (NEUMF)
Description: The new urban mobility initiative complements the proposal for revised guidelines for the Trans-European >Transport Network (TEN-T revision). The goal is for all major cities on that network to develop a sustainable urban mobility plan by 2025. The NEUMF outlines a list of measures and initiatives to meet the challenge of making their mobility more sustainable.
Relevance: 1. Contribute to EU Green House Gas reduction targets as set in the Climate Law (including -55% by 2030), 2. Improve transport and mobility to, in and around cities as well as improve the efficiency of goods and home deliveries.
Need for action:
(EU) Plan: REPOWER EU
Description: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition.
Relevance: Driver for actions proposed in the “Energy” domain”
Need for action:
(EU) Instrument: EU Recovery and Resilience plan
Description: Plan to emerge stronger and more resilient from the current crisis. Mitigating economic and social impact of the pandemic on green/digital transition opportunities
Relevance: Provides funding to MS for making economies and societies more sustainable, resilient and prepared for the green and digital transition, in line with the EU’s priorities. A number of actions included in the CCC are planned to be funded through this facility (see investment plan).
Need for action:
(EU) : Barcelona convention

Description: The Contracting Parties to the Barcelona Convention agreed to individually or jointly take all appropriate measures in accordance with the provisions of the Convention and the Protocols in force to which they are party to prevent, abate, combat and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area and to protect and enhance the marine environment in that Area so as to contribute towards its sustainable development. They cooperate in the formulation and adoption of Protocols, prescribing agreed measures, procedures and standards for the implementation of this Convention.
Relevance: Protection of the Marine Environment and Coastal Areas of the Mediterranean. Cyprus has accepted the convention with entry into force in 2004.
Need for action:
(Cypriot) National Strategy: Integrated management of coastal zones
Description: Defines the overall development framework for coastal
Relevance: Aims at the (environmentally) sustainable development of coastal areas between 2018-2028.
Need for action:
(Cypriot) National Strategy: Long-term Strategy for Building Renovation
Description: The Long-term Strategy for Building Renovation is an evolution of the Strategy for Mobilising Investment in the Field of Building Renovation, which was issued in 2014 and revised in 2017. It uses quantitative and qualitative indicators to stress the problems caused by the energy status of the building stock to date, as well as the opportunities offered by an increased mobilisation of investments in the field of deep renovations. It identifies the parties involved, the obstacles they come across and how these can be overcome. On the basis of the above, the roadmap with measurable indicators of progress by 2050, is presented. (https://meci.gov.cy/assets/modules/wnp/articles/202101/102/docs/strategyrenovation.pdf)
Relevance: Provides a road map for renovation actions in the extisitng building stock**.**
Need for action:
(Cypriot) National Policy: Renewable Energy Communities
Description: Implementation of an enabling framework to promote and facilitate the development of Renewable Energy Communities
Relevance: Increase the use of renewable energy sources (Energy consumption)
Need for action:
(Cypriot) National Strategy: Cyprus Integrated National Energy and Climate Plan
Description: Cyprus national energy and climate plan (NECP) has been drawn up to perform the requirement laid down in Article 9(1) of Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, in accordance with which each Member State must prepare and submit to the Commission their national energy and climate plan.
Relevance: Driver for actions proposed in the field of “Energy”
Need for action:
(Cypriot) National Policy: Replacement of the conventional transport fuels with biofuels

Description: According to the relevant decree, the suppliers of transport fuels (petrol and diesel) are obliged to blend biofuels to conventional transport fuels to achieve a certain target, which is percentage of biofuels to whole annual sales of petrol and diesel, in energy content.
Relevance: Increase the consumption of renewable energy in transport sector to achieve the renewable energy targets.
Need for action:
(Cypriot) National Policy: Incentives for encouraging the use of RES in different types of developments
Description: Provide incentives and/or requirements to encourage the use of RES in different types of developments, encouraging natural and legal persons to produce energy from RES. Incentives include increasing the building permit ratio, or making the use of RES is a requirement for applicability of other incentives under the development plans.
Relevance: Increase the use of renewable energy sources (Energy supply)
Need for action:
(Cypriot) National Policy: Certification of small-scale RES system installers
Description: Registration as certified installers of RES systems in the registry of the Ministry of Energy, Commerce, Industry and Tourism available for installers of small scale (up to 30kw) biomass boilers and stoves, photovoltaic systems, solar thermal system, shallow geothermal systems and heat pumps after the completion of their training and a success in a theoretical and practical examination.
Relevance: Training of RES system installers
Need for action:
(Cypriot) National Policy: Research and innovation programs in the sector of RES
Description: Participation in various Research programs regarding the implementation of CSP units, solar desalination, production of hydrogen from RES
Relevance: Research and Innovation
Need for action:
(Cypriot) National Policy: Support scheme for the production of electricity from renewable energy sources for own use Category A: Net-metering
Description: Provide the option to residential and small commercial consumers to cover all or part of their electricity consumption from a PV. Consumers pay only for the difference between the energy consumed and energy produced (net electricity used) plus a cost that reflects the cost of the electricity grid to support continuous supply and taxes.
Relevance: Increase in renewable energy (Energy supply)
Need for action: Expand the sceheme to include communal roofs and sharing
(Cypriot) National Policy: Support scheme to produce electricity from renewables using net billing
Description: Support medium and large-scale electricity consumers to cover all or part of their electricity consumption from RES. Generated RES electricity that is not self-consumed is credited to the consumer in the respective purchase price of electricity from RES. Fees and taxes are applied.
Relevance: Increase in renewable energy (Energy supply)
Need for action: Increase the budget of the scheme, lower bureaucracy

(Cypriot) National Policy: Rural development programme 2014-2020 of the Ministry of Agriculture, Rural Development and Environment
Description: Subsidy for purchasing and installing PV systems used to generate energy for own use in agricultural holdings/enterprises and for purchasing energy storage systems.
Relevance: Support rural development
Need for action:
(Cypriot) National Policy: Energy efficiency of buildings
Description: Requirements and technical characteristics need to be satisfied a nearly zero energy consumption building. According to the relevant decree, from 31st of December, 2020, all new buildings much be zero energy consumption, while from 31st of December, 2018 all new public buildings or building hosting public authorities much be zero energy consumption buildings. (https://energy.gov.cy/assets/entipo-iliko/2020_1_122.pdf)
Relevance: Provides the definitions and design guidelines for energy efficiency of buildings, related to archictural design, envelope and window insulation, shading, heating and air conditions systems, domesting hot water, lighting, and renewable energy sources.
Need for action:
(Cypriot) National Policy: Buildings' energy efficiency certificate
Description: The Energy Performance Certificate (EPC) ranks buildings in energy categories on a scale from A to H, where category A represents the buildings or building units with the highest energy efficiency. In addition, the EPC provides information on the estimated annual energy consumption, the annual CO2 emissions from energy use and the contribution of renewable energy sources to the satisfaction of the building's energy needs. The owner of the building or building unit ensures the issuance of the EPC in the following cases: • For buildings building units under construction. • For buildings or building units offered for sale and/or sold. • For buildings or building units available for rent or leased to a new tenant. • For buildings in which the total useful surface is over 250 sq.m. used by a public authority and frequently visited by the public. The EPC in this case should be posted in a prominent place from the public. Here is the Building Energy Performance Calculation methodology (https://energy.gov.cy/assets/entipo-iliko/MYEAK_KDP33-2015.pdf)
Relevance: Design and contents of buildings' energy efficiency certificate.
Need for action:
(Cypriot) National Policy: Requirements for New Technical Building Systems Installed in Existing Buildings and Building Units and Technical Systems Replaced and Upgraded Order
Description: According to the relavant decree, buildings of which their technical systems are replaced or updgraded mush follow the requirement guidelines for total energy efficiency published by the Energy Service of the Ministry of Energy, Commerce and Industry. https://energy.gov.cy/assets/entipo-iliko/ΟδηγόςΑπαιτήσεωνΤεχνΣυστ.Κτιρ.ΟικίεςΜηΟικίες.pdf)
Relevance:
Need for action:

(Cypriot) National Policy: Minimum energy efficiency requirements for buildings
Description: . Buildings contribute substantially to energy consumption in the long term due to their long life cycle and therefore it is very important to establish appropriate measures to save and make more efficient use of energy, both in new and renovated buildings. For this purpose, minimum energy efficiency requirements are applied in the following cases: • In new buildings and building units • In buildings undergoing large-scale renovation • In elements of the building envelope that are replaced or retrofitted The requirements for each building differ depending on which of the above cases they fall under and depending on the type of building. (https://energy.gov.cy/assets/entipo-iliko/Διάταγμα%20Απαιτήσεων%20Ελάχιστης%20Ενεργειακής%20Απόδοσης%202020%20.pdf)
Relevance: Provides the definitions and design guidelines for minimun energy efficiency requirements for buildings, related to archictural design, envelope and window insulation, shading, heating and air conditioning systems, domesting hot water, lighting, and renewable energy sources.
Need for action:
(Cypriot) National Legislation: Waste law
Description: The law establishes measures for protecting the environment and public health through the reduction of waste. Their consequences of production and management of waste and minimising the impact of resource consumption.
Relevance: Regulates, to a very large extent, activities in the field of circular economy.
Need for action:
(Cypriot) National Legislation: Law for packaging materials and their disposal
Description: The law establishes measures for management of packaging materials, including recycling.
Relevance: Regulates activities in the field of circular economy.
Need for action:
(Cypriot) National Initiative: Stand-alone RES systems
Description: Support scheme for installation of Stand-alone PV and small wind generators
Relevance: Increase in renewable energy (Energy supply)
Need for action: Simulate the Limassol energy ssyem for 100% RES penetration
(Cypriot) National Initiative: Installation of net-metering PV systems in houses of vulnerable consumers
Description: Financial support scheme for the installation of net-metering PV systems in houses of vulnerable consumers (low-income families, disabled persons etc.).
Relevance: Increase in renewable energy (Energy supply). Energy Poverty
Need for action: Bolster grid to accept more small systmes. Mandate BtM storage

(Cypriot) National Initiative: Support scheme for the installation or replacement of solar water heaters in households
Description: Subsidy for the installation of a solar water heater, or the installation/replacement of solar panels.
Relevance: Increase the use of renewable energy for water heating.
Need for action:
(Cypriot) National Initiative: Support scheme for the installation of RES systems that will operate in the competitive electricity market
Description: Scheme for the installation of commercial plants producing electricity from Renewable Energy Sources (RES) that will participate in the competitive electricity market. Up to one year after the operation of the competitive electricity market, the produced electricity will be sold to the Electricity Authority of Cyprus. The scheme allows the installation of commercial PV systems, wind parks, solar concentrated station, and biomass/biogas stations and wave energy systems
Relevance: Increase in renewable energy (Energy supply)
Need for action:
(Cypriot) National Initiative: Improve forecasting modelling tool for Weather to Energy production
Description: The model will combine existing studies along with existing tools and forecasting models, to further improve the day-to-day operation for the System Operator
Relevance: Reduce the Operating Reserves and increase the penetration of RES by reducing the curtailment level
Need for action:
(Cypriot) National Initiative: Support scheme for storage units
Description: Support scheme for the installation of electricity storage units in national grid that will allow the further penetration of RES
Relevance: Increase the use of renewable energy sources (Energy supply)
Need for action:
(Cypriot) National Initiative: Support scheme for the installation of net-metering photovoltaic systems with capacity up to 20KW, in public schools buildings.
Description: The measure provides the regulatory framework for the installation of 4.2 MW of photovoltaic systems in 428 public schools. The PV system will operate under the net-metering schema. Each PV system will have power up to 20kW.
Relevance: Increase in renewable energy (Energy supply)
Need for action:
(Cypriot) National Initiative: Virtual net-meting
Description: Extend net-metering scheme, in order to give the opportunity to both hotels and multi-apartment building to install a PV system with net-billing scheme (since no space is available)
Relevance: Increase the use of renewable energy sources (Energy supply)
Need for action:

(Limassol) Local Strategy: Limassol Sustainable Urban Mobility Plan (SUMP)
Description: Defines a series of actions for sustaible urban mobility.
Relevance: Mainly reflected in the actions proposed in the frame of the CCC.
Need for action:
(Limassol) Local Strategy: Integrated Limassol Development (OLA)
Description: Defines a series of strategic actions for the development of th ecity of Limassol.
Relevance: Reflected in the actions proposed in the frame of the CCC.
Need for action:
(Limassol) Local policy: Limassol Local Plan
Description: The local (Limassol) development plan in line with the regulations defined in National legislation
Relevance: Regulates, to a large extent, the development of the built environment.
Need for action:
(Limassol) Local policy: Limassol's Centre Local Plan
Description: An updated (2022) development plan for the center of Limassol, in line with the regulations defined in National legislation
Relevance: Regulates, to a large extent, the development of the built environment.
Need for action:

A-2.2: Description & assessment of policies

(describe and assess listed policies, strategies, regulations etc. to add detail)

Announced in December 2019, the "European Green Deal" is considered the cornerstone of the EU's climate policy, setting the ambitious target of and committing to achieve climate neutrality by 2050, by reducing its greenhouse gas emissions to net zero. This target has been reflected in the "European Climate Law", which sets the above goal into a legally binding target, while at the same time introducing an intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

In principle, all follow-up European Climate-related policies and the corresponding ones adopted by the Republic of Cyprus, reflect upon and work in the direction set by the above. However, the Mission on which Limassol has embarked requires that the 2050 climate neutrality goal is accelerated by at least 20 years and in doing so, this requires that long term plans are implemented (fully or locally) by 2030. This means, among others, that by 2030:

- the national electricity production will replace diesel with natural gas -which is still a fossil fuel, but with significantly lower emissions.
- the national electric grid mix will include at least 55% RES
- sufficient funds will be available to subsidize vehicle electrification and building energy retrofitting
- regulations regarding energy communities, cold ironing in ports, energy building regulations will be passed in time and enforced.

To accelerate the transition while at the same time preparing for full implementation of the relevant policies, actions and measures, the Municipality of Limassol has requested for the introduction of a "regulatory sandbox" that will allow the city the necessary regulatory competence to fulfil the transition envisaged in this CCC. Delays and deficiencies in passing and implementing the necessary regulations as well as related imponderable external barriers (such as the effect of Turkey's activities on the availability of Cypriot natural gas and the effect of international economic and political decisions on transboundary interconnection of the Cypriot electric grid) are significant risks beyond the control of the Municipality.

A-2.3: Emissions gap (kt CO2e)

	Baseline emissions (BAU 2030)	**Residual emissions offsetting[1]**		**Emissions reduction target**		**Emissions gap (amount necessary to achieve net-zero)**	
	(Absolute value)	(Absolute value)	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)
Transport	166	59	36%	106	64%	0	0%
Buildings & Heating	60	5	8%	55	92%	0	0%
Electricity	415	60	14%	355	86%	0	0%
Waste	11	4	31%	8	69%	0	0%
Other[2]	59	12	20%	47	80%	0	0%
Total	710	139	20%	571	80%	0	0%

[1] Residual emissions consist of those emissions which can't be reduced through climate action and are being offset. Residual emission may amount to a maximum of 20 % as stated by the Mission Info Kit.

[2] Emissions reduction target percentage for "Other" sector is assumed to be the same as for the other 4 main sectors unless updated by city. Activities and commitments to reduce these emissions are documented in the Climate Neutrality Action Plan.

3.3 Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality

Module A-3 “Systemic Barriers to 2030 Climate Neutrality” should document the results of the stakeholder, systems and ecosystem mapping and identification of systemic barriers and opportunities.

A-3.1: Systems & stakeholder mapping				
Barriers/ opportunities	**Stakeholders involved**	**Network**	**Influence**	**Interest**
Opportunity	Limassol municipality	Municipality; primary and secondary schools	Educational opportunity available to educate young people regarding climate change and environmental issues	Free hands program
Opportunity	Limassol municipality	Municipality ; restaurants ; hotels ; bakeries ; supermarkets etc	Readymade forum which can be used in avoiding food waste- resources not wasted and program strengthened-may increase frequency of donation	Koinoniko pantopoleio
Barrier	Ministry of interior/ planning department/ limassol municipality	Municipality ; citizens	Sustainable Urban Mobility Plan describes actions towards environmental impact mitigation and urban mobility in Lemesos	SUMP (Sustainable Urban Mobility Plan) is not part of regulations
Barrier	Green deal committee representatives Ministry of interior/ planning department	EU representatives; ministries	Green deal is an important platform towards GHG emissions mitigation and sustainability	Ministry of interior is not included in the green deal committee
Opportunity	Limassol municipality Central government	Municipality ; social groups that need support	Already formed community with the social worker having immediate access to it	Pilot-neighborhood social worker
Opportunity	Limassol municipality Central government	Municipality ; NGOs ; citizens	Education opportunity regarding environmental threats. Particularly important as migrant groups can be vulnerable	Limassol one city the whole world
Opportunity	Limassol municipality	Municipality ; citizens ;adult education providers	Educational opportunity available to educate people of all ages regarding climate change and environmental issues	Open school

Opportunity	Limassol municipality	Municipality ; start-ups ; NGOs ; citizens ; VET providers ; VET educators	Inform citizens regarding the challenges of blue economy. Development of start-ups for new technnologies, products or services in this sector	Social innovation center
Opportunity	Friends of the earth Limassol municipality	NGOs; citizens; private companies; public services	Already set up framework for zero waste for Limassol	Zero waste cities
Opportunity	Friends of the earth Limassol municipality	NGOs; citizens; restaurants; cafes; hotels; supermarkets; bakeries	Readymade forum which can be used in avoiding food waste- resources not wasted and program strengthened-may increase frequency of donation	Life foodprint – Life foodprint food waste calculator
Opportunity	Deputy ministry of innovation	Ministry ; municipality ; NGOs ; SMEs	The ministry and especially the Research and Innovation Foundation offer funding opportunities (national and EU grants)	Smart lighting Smart parking Waste Creation of data collection systems
Opportunity	Banks	Funding schemes ; investors	Funding is key for the transition especially in the form of bonds (required for upscaling ; eg deep building renovation)	Green bonds
Opportunity	GREEN DOT	Municipality ; Green Dot ; SMEs, Industry	Maximize recycling ; apply circular economy principles (avoid, reuse etc).	Sustainable waste management
Opportunity	CITY FRIENDS CLUB	Municipality ; citizens	Support transition by influencing public oppinion favouring projects relevant to GHG emissions mitigation	Improving public and environmental health.
Barrier	Ministry of transport Municipality	Municipality; citizens; professionals	Apply urban micromobility to reduce the use of cars	Lack companies for micro-mobility
Opportunity	Ports authority	Municipality Shipping companies	Support Green transition in the shipping sector ; vital for Lemesos	Implementation of EEXI (Energy Efficiency Existing Ship Index) and CII (Carbon Intensity Indicator) certification
Opportunity	Municipality	Cities initiatives	Lemesos participates in eupolis, healthy cities and is a candidate for cultural city 2030	Opportunities for funding projects related to the Transition; visibility; networking

A-3.2: Description of systemic barriers – textual elements

Urban systems, city transformation and systemic barriers

Cities are complex environment, composing of many different systems (e.g., energy, transport, buildings) (see figure below). Urban transformation, under climate change, refers to the process of improving urban areas to enhance their livability, sustainability (e.g., change electricity production system, electrification of cars) and overall quality of life for residents. However, there can be various systemic barriers that hinder this transformation.

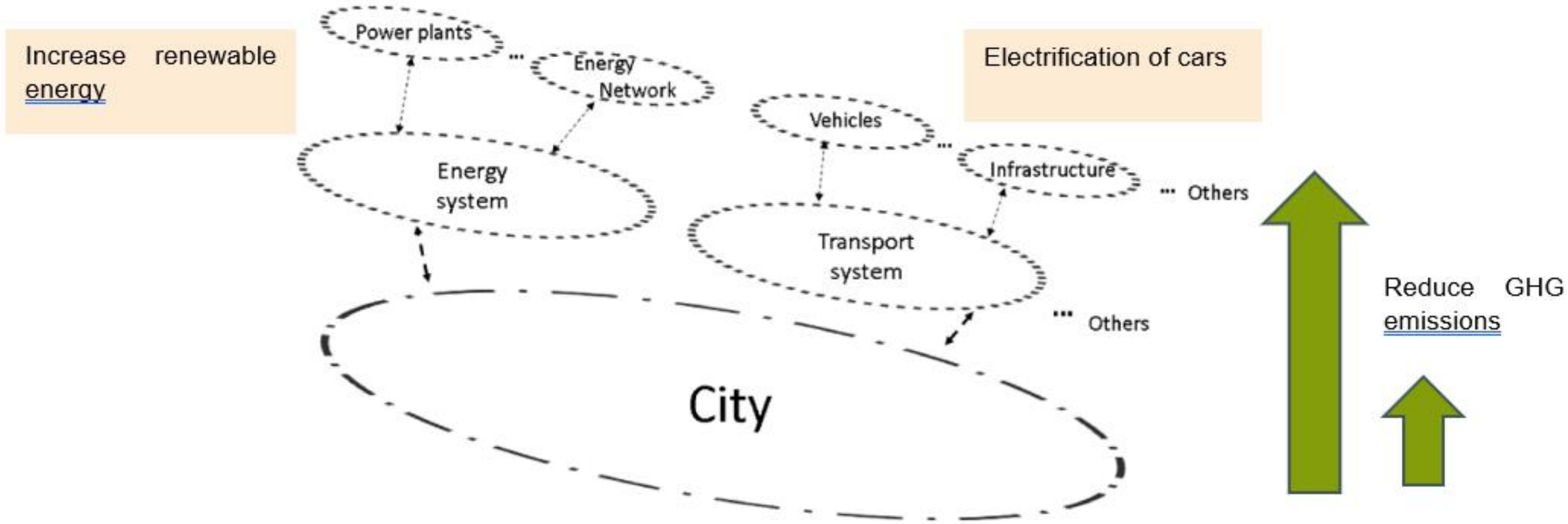


Figure 8. City from a system perspective and examples of transformation towards NZ. Modified from: https://doi.org/10.1016/j.ijinfomgt.2020.102092

These barriers often arise from a combination of **social, economic, political, and environmental factors**. Some of these barriers (indicatively) are related to: **Lack of Funding and Resources:** Many cities struggle with limited financial resources and inadequate funding for urban development projects. This can impede efforts to invest in infrastructure, public services, and other initiatives necessary for transformation. **Bureaucracy:** Complex and lengthy bureaucratic processes can slow down urban development projects, leading to delays and increased costs. **Political Challenges:** Political instability, corruption, and a lack of political will can hinder urban transformation efforts. Elected officials may prioritize short-term gains over long-term sustainability. **Inequality and Social Disparities:** Socioeconomic disparities within urban populations can be a significant barrier to transformation. Ensuring that all residents benefit from improvements is crucial, but it can be challenging to address deep-seated inequalities. **Resistance to Change:** Resistance from various stakeholders, such as residents, businesses, and property owners, can slow or block transformation efforts. People may be resistant to changes that affect their neighborhoods or livelihoods. **Zoning and Land Use Regulations:** Restrictive zoning and land use regulations can limit the flexibility and creativity needed for urban transformation. Simplifying and modernizing these regulations can encourage innovation.

The case of Lemesos

Focusing on Lemesos Transition, besides what is above described, the following are also important to be considered as barriers:

1) Reduced capacity of the municipality for the transition (human resources, city design, regulatory competence etc).
2) Social attitude (citizens, stakeholders). Stakeholders' knowledge, attitude and will; Myopic special interests; fear of the unknown; Comfort zone.
3) Financial (lack of public funds, investments, funding schemes tailored to the transition/climate change mitigation).
4) Human resources (Quality and quantity).
5) Geography (insular environment) and (Turkish) military occupation.
6) Time for the transition (2024-2030; very short for vast systemic changes).
7) Invinsibility of the emissions (no direct benefit of city-only emissions reduction; projections are that Lemesos temperature will increase).

In relation to the above, Lemesos is missing data and digital systems (e.g. traffic model) in form that are not cumbersome to access and allow use for decision making. There are Gaps, such as social knowledge, understanding, interest and trust on topics relevant to the transition. The tradition of involvement into public affairs should be considered, procedures of cooperation among stakeholders and mentality of zero sum game. Regarding funding and public money there is the issue of social suspicion vs. accountability (transparency). There is lack of know how and experience related to huge projects implementation (and the break-down into smaller; independent but interconnected). This fact, in combination to the short time period (to 2030) is very challenging. In combination to the projects, there should be a concrete campaign against misinformation which yields mistrust. Additionally, Lemesos will change city boundaries (in 2024) due to a reform to reduce municipality entities in Cyprus. Plus, municipal elections.

Opportunities are related to structural and other funds that are actively involved in several large projects in Cyprus (e.g., the building industry), the financial sector in the island which is a strong part of the national economy (deposits, investments), there are top ranked universities and research centres that include experts in all the thematic cpmponents that are related to the transition. The port and the coastal front of Lemesos are huge assets (nationally and internationally). The NZC mission and the EU regulations/strategies (eg Green Deal, Waste, One Health) favor the actions that are linked to the transition, many of which are national obligations towards the EU (e.g., applying the waste management directive). Another important opportunity lies in the establishment of Lemesos NZC 2030, Inc, which will support the municipality for the implementation of the actions related to NZ. Finally, the size of Cyprus is small in comparison to other EU countries (and could be comparable to a district), which has the advantage of personal connections to important stakeholders.

The participatory model (section A.3.3) considers all the above, to achieve the aims and objectives of the transition.

A deeper (indicative) analysis - The example (complexity) of deep renovation of the building stock (Action 1 of the Build Env.)

The following are linked to the complexity related to systemic change for the action of deep renovation of the building stock:

- The deep renovation of the building stock of Limassol at a rate compatible to achieve the NZC target requires huge quantities of building materials (e.g. insulations, membranes) and components (e.g. high-performance windows and doors, HVAC components, sensors, wires). The lack of an established local supply chain is a crucial barrier, resulting in a strong dependence on imports. Nevertheless, it constitutes an opportunity to set a national industrial plan to stimulate local industrial production and require the establishment of effective supply chain for the materials and components that won't be produced and/or assembled locally.
- The deep renovation of existing buildings and the construction of carbon-neutral buildings require very skilled workforce. In particular SMEs do not typically have the required skills to install advances HVAC components, provide airtight envelopes, integrate multifunctional devices. This constitutes an opportunity to provide hand-on and theoretical training for upskilling and reskilling the construction workforce.
- Professional practice in Cyprus is only recently integrating environmental assessment schemes for high-performance buildings. This requires a theoretical training and establishment of building monitoring/metering for commissioning purposes.
- There is a lack of an established network of weather stations to monitor environmental parameter (mostly related to the thermal and air quality domains) in different areas of the city. It is an opportunity to model the city with mesoscale models and identify the most relevant spot where more severe conditions may happen.
- In the last years, induced by the COVID19 pandemic and exacerbated by the Russian-Ukrainian war, we have assisted soaring prices, increasing interest rates, rising construction costs, and stagnant wages causing the rise of economic inequality.
- The increase of the real estate prices in the center and coastal areas of the city are causing the displacement of local people to suburbs and more prereferral areas.
- High regeneration projects are substantially changing the morphology, functions and identity of some areas of the city causing a loss of the original place character.
- As in other cities of Cyprus, also in Limassol there are abandoned spaces and buildings, which will not be easily regenerated or renovated.

Overcoming the systemic barriers requires a coordinated effort involving government, private sector, and community stakeholders. It often involves comprehensive planning, policy reforms, and a commitment to inclusivity and sustainability in the urban development process. Additionally, addressing these challenges may require innovative financing mechanisms and the engagement of multiple levels of government and international partners. All these efforts to overcome the systemic barriers (and many more) are presented in the next section (A3.3.) and other parts of the AP for NZ Lemesos 2030 (e.g., B.1, Introduction).

A-3.3: Description or visualisation of participatory model for the city climate neutrality – textual and visual elements

Our participatory Transition design and Transition governance models have the following Instruments (one sentence description here; reference to more detailed elsewhere in the CCC). The following graphics depict our Stakeholder and Citizen Participation models:

1. Co-workshops, or participatory co-design solution workshops are long-term groups of people from a homogeneous shareholder or citizen group who meet and structured discuss, in person and online; they produce solutions on specific issues of their concern and competence (see Introduction Section 3.4).

2. The Lemesos Commons is the central holistic advisory body of the Transition; it expresses the integrated view of stakeholders and citizens on solutions designed by co-workshops; it consists of 25 randomly selected co-workshop 'graduates' rotate semi-annually (see Introduction Section 3.4).

3. The "Lemesos NZ Lemesos 2030, Inc." organization is the executive branch of the Transition; initially established by the L.M. it is a broad-base shareholder company with the L.M. and other authorities holding about 25% (none more than 10%), other institutional stakeholders about 20% (none more than 3%), individual business about 20% (none more than 2%) and individual citizens 35% (each up to .1%).

4. Regulatory sandbox is the L.M. competence to design, advance and apply regulations that will give it more flexibility, greater enforcing powers and accelerating capacity not only on issues directly affecting the NZ Transition but also on enabling ones (such as building regulations, education and training, supply chains, traffic and others) typically taken from EU directives before they become regulations or policies (that are already being applied in other cities) and their adoption in Cyprus will take a long time.

5. "Let 100 flowers bloom" is the central social innovation program of the Transition that includes a few hundred small (10-40K€, less than a year long) climate resilience projects with the objective of trying scalable ideas and the "hidden curriculum" of advancing Citizen and Stakeholder active involvement.

6. The organized Transition Arena consists of the coordinated operation and interaction of five Transition Teams: the L.M. Internal Transition Team, The Scientific Thematics Transition Team, The Social Transition Team, The Political (MEL) Transition Team, and the Implementation Transition Team.

7. The semi-annual Lemesos NZ Transition Conference, a public 2-day event bringing together Stakeholders and citizens giving space for reporting and accountability to each participating entity and giving the opportunity to L.M. to present the next version of the CCC.

The whole Transition process is coordinated in a decentralized way by the L.M. who advance principles, objectives and the master plan, but do not need to pre-approve details, so that they do not delay activities. (The idea is that the Transition cannot move like a Roman Legion; rather its coordination is that of a natural ecosystem allowing conflicting vews and healthy competition).

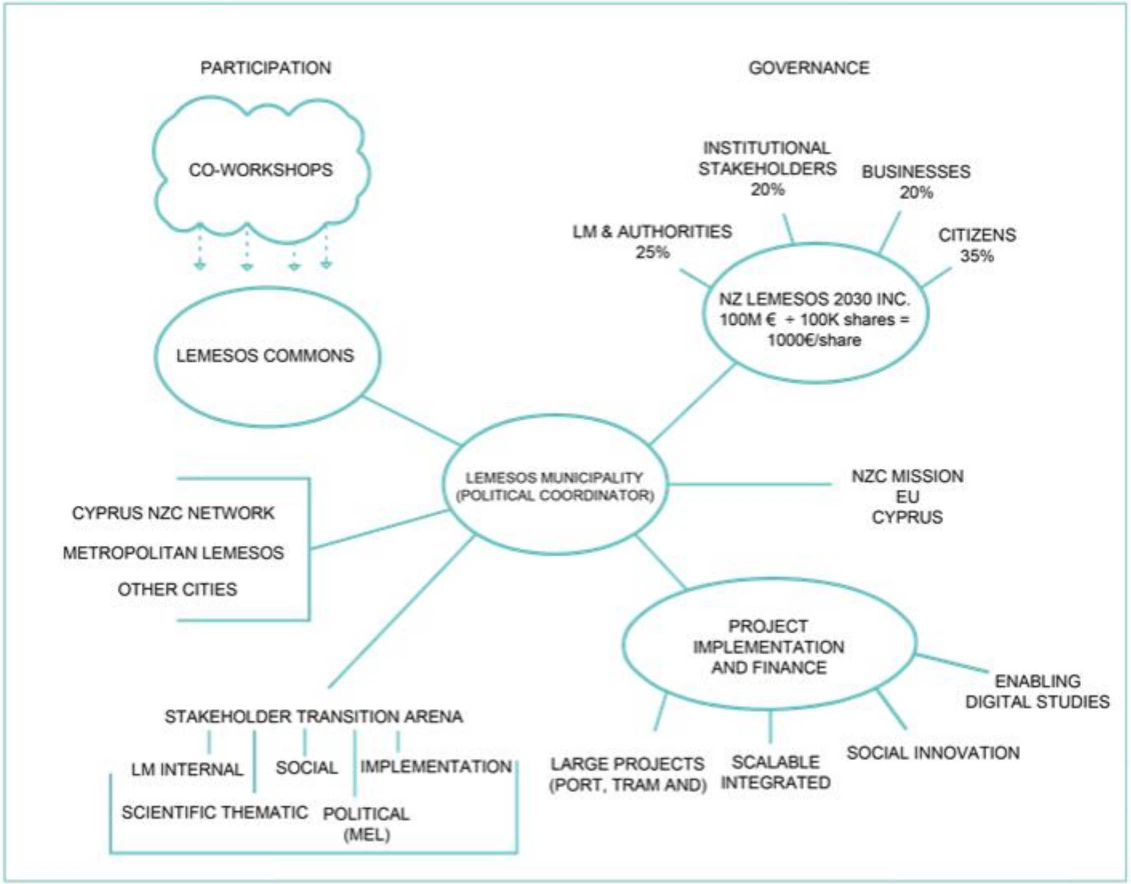


Figure 9. Stakeholder and citizen participation model

The degree and quality of Participation of each natural and legal person will finally be based on:

- Initiative taken and time and resources each spends.
- Contribution made.
- Knowledge, skills, competence, and relevant authority.

- Potential and impact
- Emissions produced and potential for emissions reduction.
- The “just transition” and “leave no one behind” principles.

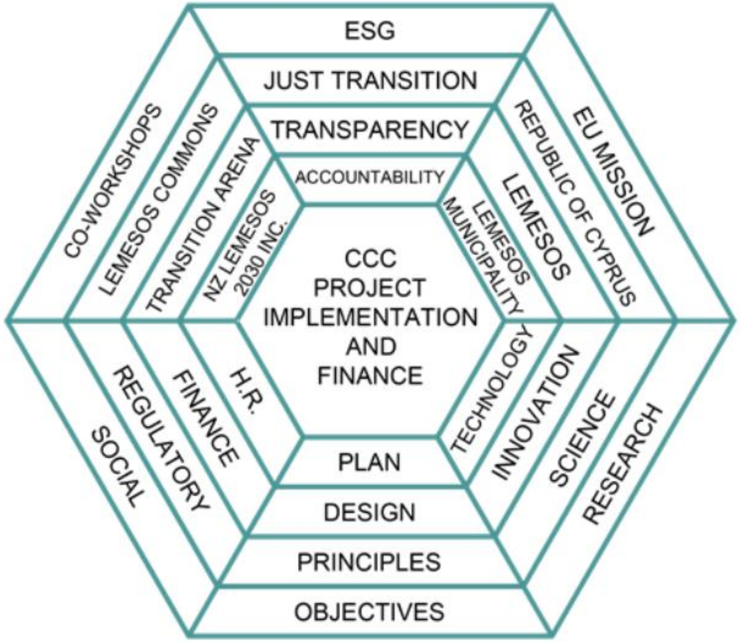


Figure 10. The six facets of the transition plan

4 Part B – Pathways towards Climate Neutrality by 2030

Part B represents the core of the Action Plan, shaped by local authorities, local businesses and stakeholders, comprising of the most essential elements: scenarios, strategic objectives, impacts, action portfolios and indicators for monitoring, evaluation and learning.

4.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

Module B-1 "Climate Neutrality Scenarios and Impact Pathways" should list impact pathways, early and late outcomes and direct and indirect impacts (co-benefits) according to and adapted from the NZC Theory of Change and the AP Guidance

B-1.1.1: Impact Pathways Energy Systems	
	Technology/Infrastructure
Early changes (1-2 years)	**New Renewable Energy Systems (RES) capacity**: Widespread adoption of various renewable energy technologies (PV and wind predominantly) have the largest impact on emissions as Lemesos is rapidly moving toward electrification of many end use sectors. **New Behind-the-Meter Storage**: New storage behind-the-meter will eliminate the risk of curtailment and allow deeper penetration of RES **Conversion of traditional boilers with Heat Pumps**: A significant proportion of city dwellings in Lemesos still relies on traditional oil-fired boilers for space and water heating. These will gradually be replaced by air-source heat pumps. **Familiarity with solar thermal technologies**: Industrial processes heat can be supplied by tailor-made solutions (like the Fresnel systems proposal in action 2). This will bring end users and installers one step closer to non-fossil-fuel based solutions for such applications.
Late outcomes (3-4 years)	**Novel synergies between RES, storage, and the operators (DSO, TSO):** Propagation of the solutions proposed will require the active engagement of the system operators (Distribution and Transmission system Operators). **Centralized energy storage (Community, municipality):** Centralized energy storage systems at the city level is a novelty for Cyprus, especially under new business models such as energy communities and a possible alternative DSO/producer model. **Integration of large, centralized Long-Term Energy Storage (LDES)**: LDES is projected to be important for energy systems relying on RES. It complements battery storage, and its deployment in the city level is an important and necessary milestone.

Direct impacts (Emission reductions	**Reduction of GHG emissions**: All actions in the energy thematic lead to substantial reduction in greenhouse gas emissions, both individually and combined. The largest drop comes from two main sources: Large-scale deployment of PV systems on rooftops coupled with battery storage, and the deployment of central, hybrid energy system combined with a central energy storage system. These actions are responsible for more than half of the emissions reduction of Lemesos in 2030.
Indirect impacts (co-benefits)	**Health benefits (improved air quality)**: Switching to RES and storage and phasing out fossil fuels in scope 2 electricity generation and within the city limits when replacing oil and gas boilers, as well as diesel generators and oil burners in industrial settings brings about multiple (and well documented in literature) health benefits due to improved air quality and reduce particulate emissions (PM10 and PM2.5) and other harmful aerosols. **Health improvements (vibration, noise, smell)**: In addition to air quality, clean energy technologies replace systems that are associated with elevated noise, vibration, and smell levels. **System resilience (incl. grid services):** The city energy systems proposed will add to the grid resilience and significantly decrease system-wide curtailment. Not only are they not a burden to the grid, but they also offer stability services by spreading out generation and minimizing the impact of faults. **Energy security**: The significant reduction in imported fossil fuels increases the self-reliance on indigenous energy sources. **Reduced energy poverty**: All actions in energy (but especially those that target distributed systems) can yield long-term cost savings for building owners and tenants and improved access to energy, resulting in a reduction of the energy poverty exposure and of the energy-poverty related mortality.
Governance/Policy	
Early changes (1-2 years)	**Regulatory framework for communities**: The concept of energy communities is not yet applied in Cyprus, even though it's widespread in several locales, especially in Europe. Lemesos aims to be pioneering the concept's implementation in Cyprus with a community within its borders using the co-operative scheme, the regulatory framework for which is not yet finalised. The creation of the community will accelerate the maturity of this framework. **New incentives**: New incentives at the local/community level will need to be gradually implemented, in collaboration with national authorities. These should target areas such as energy communities, support for vulnerable households, the easy provision of BtM storage etc.
Late outcomes (3-4 years)	**Integration in energy market**: The energy community and/or the municipality itself as a DSO will be able to participate in the electricity market, reaping additional monetary benefits. **Coordinated policy landscape between municipal and national authorities:** The acceleration of actions at the city level will expedite the convergence between regulations and policies at the national and municipal level.
Direct impacts (Emission reductions	

Indirect impacts (co-benefits)	**Governance resource efficiency**: Simplifying and expediting the permitting and approval processes for all energy projects. This can be achieved by creating dedicated review teams, implementing online application systems, and providing clear guidelines to ensure a smooth and efficient process. This in turn will reduce the demand for dedicated staff on these actions and increase processing speed and efficiency. **Opportunity for municipality to become a DSO/Provider**: Generating and storing energy in centralised locations (not necessarily within the city boundaries, see action 6 description) will necessitate the city itself to become a DSO and producer to obtain the right to count the energy it produces as its own. This is a novel approach for Cyprus at any level.
Social innovation	
Early changes (1-2 years)	**New skills and capacities at prosumer level**: The energy interventions proposed will turn energy consumers to energy prosumers – the first step towards assumption of ownership of production means.
Late outcomes (3-4 years)	**Equity and inclusion in energy access**: The later outcome focuses on ensuring social equity and inclusion in the energy transition of Lemesos. It emphasizes the engagement of marginalized groups, low-income communities, and vulnerable populations. By prioritizing their needs and perspectives the process will address social inequalities, energy poverty, and energy access. **Education and awareness campaigns**: The actions will promote behavioural change among citizens by establishing education and awareness campaigns. **Behavioural shift:** All the action will result in a degree of behavioural change, more so in those that include participatory action (energy community, small PVs and BtM storage) by shifting the mindset on what energy production, storage and use means.
Direct impacts (Emission reductions	
Indirect impacts (co-benefits)	**Social cohesion**: The actions will result in closer ties within the community where energy is treated as the valuable commodity it is.
Democracy/Participation	
Early changes (1-2 years)	**Consumer -> prosumer**: The energy interventions proposed will turn energy consumers to energy prosumers – the first step towards assumption of ownership of production means. **Information Campaigns**: The actions are proposing deep and rapid changes to the energy mix of the city. These will have to be communicated via targeted information campaigns. **Stakeholder engagement:** The early changes of all actions involve engaging a wide range of stakeholders, including government agencies, policy makers and local authorities, building owners, construction firms, energy service companies, community organizations, engineers, technicians, installers, academics, researchers, and the public at large. First steps will be made to engage all these groups, to be fully developed at a later stage.

Late outcomes (3-4 years)	**Jointly owned means of production**: Actions that target local ownership (energy community, local RES, Fresnel) fundamentally shift the sense of ownership of production means from the central and remote to the local and own, resulting in elevated responsibility for operation, and optimisation of performance. **Sense of inclusion**: Similarly, the city actions will instil a sense of inclusion for all citizens. **Multi-stakeholder engagement:** The energy transition process involves engaging a wide range of stakeholders, including government agencies, policy makers and local authorities, building owners, construction firms, energy service companies, community organizations, engineers, technicians, installers, academics, researchers, and the public at large. This requires deep and careful multi-stakeholder engagement, ensuring that diverse perspectives, expertise, and resources are leveraged. This inclusive approach facilitates collaboration, knowledge-sharing, and collective decision-making for the deep changed prescribed in this document. **Reduced energy poverty**: All actions in energy (but especially those that target distributed systems) can yield long-term cost savings for building owners and tenants and improved access to energy, resulting in a reduction of the energy poverty exposure and of the energy-poverty related mortality.
Direct impacts (Emission reductions	
Indirect impacts (co-benefits)	**Opportunity for energy trade among members, including P2P**: The energy community action will allow novel modalities of energy and financial exchange between members, including on Peer-to-Peer platforms. **Local Job creation**: The actions will demand resources in technicians, planners, engineers and labourers among others at a very large scale. Most of these jobs will require a large degree of local sourcing, increasing the employment prospects (and demands) for Lemesos.
Finance/Funding	
Early changes (1-2 years)	**New opportunities for private investors**: The sheer size of the actions proposed will mean a diverse mix of financing sources, the bulk of which will come from private sources, either private individuals or commercial entities.
Late outcomes (3-4 years)	**New 'microfinancing' schemes**: Financing schemes targeting small interventions at the local level will allow for faster adoption of energy solutions. **Public-private partnerships:** Opportunity to establishing partnerships between public bodies and private investors or companies (e.g., ESCos) to finance projects with substantial upfront costs (such as systems under energy action 6). **Green bonds:** Issuing green bonds to raise funds specifically for citizens requiring access to clean energy. These bonds attract socially and environmentally conscious investors and provide capital. The funds raised can be allocated to building owners or community managers through appropriate mechanisms.
Direct impacts (Emission reductions	

Indirect impacts (co-benefits)	**Lower energy bills:** The trend towards decentralised energy production, ownership and consumption, as well as the decreasing cost trend of the actions proposed will mean eventually a lower energy bill for consumers compared to the projected costs on a BAU scenario.
Learning/Capabilities	
Early changes (1-2 years)	**Early trendsetting**: All the actions will bring Lemesos and its citizens to the forefront of developments on decarbonisation of cities, setting an example not only for Cypriot standards, but internationally. **Familiarity with solar thermal tech**: Even though PV is now commoditised, energy solutions using solar power via harnessing thermal energy is not so common. The Fresnel action will change this. **Pilot / demonstration projects**: Some of the actions are at early stages of deployment (at least for Cyrus) and will serve as demonstration.
Late outcomes (3-4 years)	**Capacity building and skills enhancement**: Enhancing the skills of professionals involved in the energy transition process of Lemesos. This includes planners, academics, researchers, engineers, construction workers, energy auditors, technicians and policymakers. Capacity building initiatives provide training programs, workshops, and certifications to develop the necessary expertise in energy efficiency, renewable energy integration, and advanced technologies.
Direct impacts (Emission reductions	

B1.1.2: Impact Pathways Built Environment_Action 1: Deep Energy Refurbishment of the Building Stock and Urban regeneration

Technology/Infrastructure	
Early changes (1-2 years)	**Technology integration in buildings:** Deploying energy conservation measures like thermal insulation, high-performance windows, effective solar shadings. Encouraging the replacement of legacy equipment with advanced energy-efficient technologies like heat pumps, solar-assisted cooling systems, mechanical ventilation systems. Integrating state-of-the-art building-level monitoring and control systems leveraging IoT, such as smart meters, energy management and automation systems. Adopting local, building-connected/integrated renewable energy systems, such as solar and PV panels and geothermal heat pumps, will further reduce dependence on fossil fuels. **Technology integration at the neighbourhood scale**: Enabling interactive and engaging experiences to make open spaces more sustainable and enjoyable for the community. Smart lighting systems can create dynamic and customizable lighting schemes, interactive displays and augmented reality applications can provide informative and interactive elements to citizens. Sensors and data analytics can optimize resource usage (e.g., water for irrigation), and

	enhance climate resilience. RES can provide electricity yield and shading for fostering walkability. EV chargers can promote the shift towards electro-mobility **Pilot projects for Zero Emission Buildings in thriving neighbourhoods**: Starting pilot projects to test design methodologies, construction practices, monitoring and evaluation procedures on specified buildings in representative neighbourhoods to achieve the Zero Emission City Target. And establishing a learning process.
Late outcomes (3-4 years)	**Infrastructure upgrade:** Deploying smart-grid technologies, installing EV chargers at building and district levels, and installing building and neighbourhood energy storage capacity for enabling grid-interactive buildings in a smart city **Urban Heat and Pollution Islands Mitigation:** Deep renovations will address urban heat island effects by incorporating strategies such as green roofs, cool pavements, and urban greening. These measures will mitigate the urban heat island effect, reduce energy consumption for cooling, and improve local microclimates. The result will be a more comfortable and sustainable urban environment for residents and visitors alike.
Direct impacts (Emission reductions	**Reduced GHG emissions:** By implementing this action will contribute to a substantial reduction in greenhouse gas emissions. The upgraded building stock will consume less fossil fuel-based energy, resulting in lower carbon dioxide and other greenhouse gas emissions. This will support local and national climate change mitigation efforts, helping Limassol achieve its emission reduction targets.
Indirect impacts (co-benefits)	**Improved air quality:** Deep renovation of the building stock can improve air quality by reducing emissions from buildings and their systems. This can have a positive impact on public health and the environment.
Governance/Policy	
Early changes (1-2 years)	**Land use protection**: A policy framework on land use can promote urban micro-forestation and densification by incentivizing the incorporation of green spaces and trees in urban areas. This can include requirements for minimum tree coverage, incentives for developers to integrate green spaces, and zoning regulations that prioritize mixed-use developments and compact urban designs. By combining micro-forestation with densification efforts, cities can enhance biodiversity, improve air quality, mitigate urban heat island effects, and create more vibrant and sustainable urban environments. **Update of building policies for NZC**: Updating energy performance standards, building codes, and mandatory compliance for energy conservation, adoption of renewable energy technologies, energy-efficient equipment, and sustainable building materials to enable an effective GHG emission reduction, in actuation of EU Directives and NZC goal. **Incentive schemes**: Designing an incentive policy for promoting deep renovations e.g., by offering a tax relief to the expenses incurred for the implementation of specified interventions aimed at emission reduction
Late outcomes (3-4 years)	**Coordinated policy landscape**:

	The establishing a comprehensive regulatory framework for deep renovation initiatives. It includes energy performance standards, streamlined permitting processes, financial incentives, capacity building, and monitoring mechanisms. This framework ensures clarity, consistency, and effectiveness in driving sustainable building practices and achieving long-term goals **Collaborative governance structures:** Establishing mechanisms that facilitate stakeholder engagement and decision-making processes. Based on platforms for ongoing dialogue, coordination, and accountability among stakeholders, collaborative governance enhances transparency, trust, and cooperation, enabling effective implementation and monitoring of deep renovation initiatives **Sustainable urban planning**: Developing collaborative urban planning practices, which considers all perspectives of the involved actors and stakeholders for creating sustainable, beautiful and inclusive cities. Encouraging mixed-use planning with the promotion of flexible and adaptable design of open spaces. Incorporating sustainable design practices.
Direct impacts (Emission reductions	**Increased rate of retrofit:** accelerated adoption of building renovation and energy efficiency measures, resulting in reduced energy consumption, lower carbon emissions, and improved building performance in existing structures.
Indirect impacts (co-benefits)	**Reduced heat island effect:** Deep renovation of the building stock can mitigate excessive heat buildup in urban areas, leading to lower ambient temperatures and improved urban comfort.
Social innovation	
Early changes (1-2 years)	**Collaborative platforms:** Creating collaborative platforms to raise awareness, share best practices, and provide technical assistance **Training programs**: Developing targeted training programmes for skilling, upskilling, reskilling the professionals involved in the renovation process, fostering a skilled workforce **Equity and inclusion in energy access**: Establish mechanisms to identify and mitigate energy poverty and provide support to vulnerable groups
Late outcomes (3-4 years)	**Education and awareness campaigns**: Promoting behavioural change among citizens by establishing education and awareness campaigns **Community-driven initiatives:** Promoting energy-saving competitions, and awareness programs to encourage sustainable practices, such as energy conservation, waste reduction, and responsible resource use **Centre of Information**: Establish Centers of information where individual owners can meet advisors; where professionals can get data and info on the market and products as well as contacts of professionals

Direct impacts (Emission reductions	**Reduced energy demand, needs, or consumption:** Deep renovation of the building stock will result in significant improvements in energy efficiency. Upgrading insulation, sealing air leaks, and installing energy-efficient appliances and lighting systems will reduce energy consumption in buildings. This will lead to lower energy bills for building owners and tenants, reducing energy poverty and increasing affordability.
Indirect impacts (co-benefits)	**Enhanced physical and mental well-being, comfort and productivity:** Deeply renovated buildings prioritize occupant comfort and well-being. Upgrades to insulation, ventilation, and indoor air quality systems create a healthier indoor environment. Enhanced thermal comfort, improved air quality, and reduced noise levels positively impact occupants' health, productivity, and overall quality of life.
Democracy/Participation	
Early changes (1-2 years)	**Stakeholder engagement**: Creating mechanisms to incorporate different opinions and expertise in the decision-making procedures of the municipality by engaging building owners, tenants, professionals, construction firms, construction associations, municipal offices, related ministerial offices, and other relevant stakeholders **Participatory city regeneration**: Identifying bodies and establishing mechanisms to enable citizens and civil society to co-design the city regeneration **Green Economy and Innovation Observatory**: Establishing an Observatory for Green Economy and innovation to promote transparency by leveraging FAIR data from application to incentive schemes
Late outcomes (3-4 years)	**Multi-stakeholder engagement:** The deep renovation process involves engaging a wide range of stakeholders, including government agencies, building owners, tenants, construction firms, architects, energy service companies, and community organizations. The later outcome is enhanced multi-stakeholder engagement, ensuring that diverse perspectives, expertise, and resources are leveraged to drive the deep renovation agenda. This inclusive approach facilitates collaboration, knowledge-sharing, and collective decision-making **Community participation and empowerment:** The later outcome emphasizes community participation and empowerment in deep renovation projects. Local residents are engaged in the decision-making process, encouraging them to take an active role in shaping the renovation strategies. Participatory approaches, such as community meetings, workshops, and focus groups, enable community members to express their needs, priorities, and aspirations. This involvement instils a sense of ownership and empowers communities to drive sustainable change **Social equity and inclusion:** The later outcome focuses on ensuring social equity and inclusion in deep renovation projects. It emphasizes the engagement of marginalized groups, low-income communities, and vulnerable populations. By prioritizing their needs and perspectives, the deep renovation process can address social inequalities, reduce energy poverty, and create equitable access to sustainable and affordable housing
Direct impacts (Emission reductions	**Reduced energy poverty:** Deep renovation can yield long-term cost savings for building owners and tenants and better indoor environmental conditions, resulting in a reduction of the energy poverty exposure and of the energy-poverty related mortality.

Indirect impacts (co-benefits)	**Enhanced liveability attractiveness/ aesthetics:** Deep renovation of the building stock can improve the physical and visual qualities of a place, creating a more appealing and enjoyable environment that enhances the overall quality of life for residents and visitors.
Finance/Funding	
Early changes (1-2 years)	**Targeted financial mechanisms:** Establishing financial mechanisms such as subsidies, grants, low-interest loans, and tax incentives to facilitate the cost-effective implementation of deep renovations. **De-risk deep energy renovations**: Overcoming the current investment gap by mobilising private financing through providing long-term funding to final beneficiaries and reducing project financing risk. **Public-private partnerships**: Establishing partnerships between public bodies and private investors or companies (e.g., ESCos) to activate private capitals for enabling deep energy renovation and optimal operation and maintenance
Late outcomes (3-4 years)	**Innovative funding mechanisms**: Creating innovative funding mechanisms specifically designed to support deep renovation initiatives. This may include green bonds, revolving loan funds, public-private partnerships, and energy efficiency financing programs. These mechanisms provide accessible and affordable financing options for building owners and stakeholders, enabling them to undertake deep renovation projects without incurring significant upfront costs **Risk mitigation strategies**: Developing risk mitigation strategies to address financial uncertainties and risks associated with deep renovation projects. This involves mechanisms such as insurance products, loan guarantees, and performance-based contracting arrangements. These strategies reduce the perceived risks for investors and financial institutions, enhancing their confidence in supporting deep renovation initiatives
Direct impacts (Emission reductions	**Increased carbon sequestration**: Promote the capture and storage of carbon dioxide from the atmosphere, primarily through the growth and preservation of urban forests, green infrastructure, and other carbon-absorbing ecosystems. Increased carbon sequestration promotes biodiversity, enhances ecosystem services, and contributes to the overall goal of achieving a carbon-neutral or carbon-negative future.
Indirect impacts (co-benefits)	**Improved access to information, awareness & behaviour change**: Empowered individuals and communities to make informed choices. Through educational campaigns, workshops, and online platforms, information about sustainable practices is disseminated, raising awareness and promoting behaviour change towards more sustainable lifestyles. This co-benefit leads to increased environmental consciousness, responsible consumption, and active participation in sustainability efforts, ultimately contributing to the transition towards a greener and more sustainable society.
Learning/Capabilities	
Early changes (1-2 years)	**Data collection:** Establishing a robust system for data collection on the different aspects characterising the building stock, such as building information, cost of interventions, prises of the materials and products, energy used for final service, GHG emissions **Informative campaigns**:

	Promoting informative campaign for citizens to provide information on motivations, purposes, scope of the action and on related technological infrastructures and components, policies financial subsidies, behavioural change. **Demonstration Projects and Pilots:** Implementing demonstration projects and pilots to showcase the feasibility and benefits of deep renovation. These projects serve as real-world examples that illustrate the successful integration of energy-efficient technologies, renewable energy systems, and sustainable building practices. Demonstration projects also provide valuable insights and data to inform decision-making, evaluate performance, and refine approaches for future deep renovation initiatives.
Late outcomes (3-4 years)	**Continuous monitoring and evaluation:** Establishing continuous monitoring and evaluation mechanisms to assess the performance and impact of deep renovation projects. This includes tracking energy savings, greenhouse gas emissions reductions, cost-effectiveness, occupant satisfaction, and overall sustainability outcomes. **Capacity building and skills enhancement:** Enhancing the skills of professionals involved in deep renovation projects. This includes architects, engineers, construction workers, energy auditors, and policymakers. Capacity building initiatives provide training programs, workshops, and certifications to develop the necessary expertise in sustainable building practices, energy efficiency, renewable energy integration, and advanced technologies **Future citizens:** Establishing programs to inform, communicate and involve the future citizens (youth) in the city regeneration process in primary and secondary schools
Direct impacts (Emission reductions	
Indirect impacts (co-benefits)	**Increased number of skilled jobs & rate of employment**: Deep renovation initiatives generate employment opportunities and stimulate local economic growth. The extensive retrofit projects require skilled labour in construction, engineering, architecture, and energy services. These jobs can provide stable employment for the local workforce and attract investment in the Carbon-neutral building sector. Furthermore, the renovation activities spur demand for building materials, equipment, and related services, supporting local businesses.
Digitalisation	
Early changes (1-2 years)	**Increased number of skilled jobs & rate of employment**: Deep renovation initiatives generate employment opportunities and stimulate local economic growth. The extensive retrofit projects require skilled labour in construction, engineering, architecture, and energy services. These jobs can provide stable employment for the local workforce and attract investment in the Carbon-neutral building sector. Furthermore, the renovation activities spur demand for building materials, equipment, and related services, supporting local businesses. **Digitalisation of the building stock**: Establish mandatory requirements for digital documentation via BIM for all deep renovation and new building requests
Late outcomes (3-4 years)	

Direct impacts (Emission reductions)	
Indirect impacts (co-benefits)	**Increased urban forestry, plantation & improved plant heath:** Deep renovation initiatives can contribute entailing expansion of green spaces, the establishment of urban forests, and the implementation of measures to enhance the well-being of plants. This leads to greater biodiversity, improved air quality, reduced pollution, and a healthier ecosystem. It also contributes to the beautification of urban areas and provides numerous benefits such as shade, habitat for wildlife, and a sense of tranquility for residents. **Nature restauration:** Deep renovation initiatives can revitalize and rejuvenate degraded or damaged natural ecosystems. It involves initiatives such as reforestation, wetland restoration, habitat rehabilitation, and biodiversity conservation. Nature restoration aims to restore ecological balance, enhance biodiversity, improve ecosystem services, and promote the recovery of natural habitats. This process helps to mitigate the effects of environmental degradation, preserve biodiversity, and create healthier and more resilient ecosystems for the benefit of both nature and human well-being. **Increased resilience to climate change:** Deep renovation of the building stock can make buildings more resilient to climate change by making them more resistant to extreme weather events, such as heat waves, floods, and droughts. This can help to protect property owners and the city from the negative impacts of climate change. **Increased property value and decreased future maintenance & capital costs:** Deeply renovated buildings tend to have higher market value due to their improved energy performance, lower operating costs, and alignment with sustainability standards. Building owners can command higher rents or sales prices for energy-efficient properties. Additionally, Carbon-neutral building certifications and labels can further enhance the market value and attractiveness of the renovated buildings

B1.1.3: Impact Pathways Built Environment_Action 2: Construction of New Buildings

	Technology/Infrastructure
Early changes (1-2 years)	**Technology uptake:** New buildings shall be designed and constructed to be net zero emission buildings and avoid any possible carbon lock-in. They shall adopt very high energy conservation measures (like highly insulated building envelopes, high-performance windows with low-emission glazing, effective solar shadings, advanced energy-efficient technologies like heat pumps, solar-assisted cooling systems, and mechanical ventilation systems with air filtration units (needed to face the increase of dust in the air for protecting people's health). Integrating state-of-the-art building-level monitoring and control systems leveraging IoT, such as smart meters, energy management and automation systems. Adopting local, building-connected/integrated renewable energy systems, such as solar and PV panels and geothermal heat pumps. Integrate EV chargers at building and district levels, and installing building and/or district energy storage capacity

	Local electricity storage capacity. By integrating energy storage systems within new carbon-neutral buildings, excess renewable energy can be stored and utilized during high-demand periods, reducing reliance on the grid and promoting renewable energy self-sufficiency. This helps optimize energy usage, increase resilience, and accelerate the transition towards carbon-neutral buildings.
Late outcomes (3-4 years)	**Seamless integration of green and blue solutions**: The design and construction of a new building is a unique case of use of resources and energy that must be accurately assessed, judged and conducted. It has to offer a contribution to the city in dealing with the current and future environmental challenges therefore, both adaptation and mitigation strategies have to be considered to tackle the climate-exacerbated impacts affecting Limassol like extreme heat, dust and air pollution, water scarcity, flooding, sea level rise, trough seamlessly integrating green and blue solutions. **Climate resilient energy infrastructure:** Deploying smart-grid technologies, installing EV chargers at building and district levels, and installing building and neighbourhood energy storage capacity for enabling grid-interactive buildings in a smart city
Direct impacts (Emission reductions	**Reduced GHG emissions:** By implementing this action will contribute to a substantial reduction in greenhouse gas emissions. The upgraded building stock will consume less fossil fuel-based energy, resulting in lower carbon dioxide and other greenhouse gas emissions. This will support local and national climate change mitigation efforts, helping Limassol achieve its emission reduction targets **Increased energy efficiency:** Improved utilization of energy resources to achieve the desired outcomes while minimizing energy waste. It involves implementing technologies, practices, and policies that reduce energy consumption, enhance energy performance, and optimize energy use across various sectors. Increased energy efficiency leads to lower energy costs, reduced greenhouse gas emissions, enhanced sustainability, and a more resilient energy system, contributing to environmental protection and long-term energy sustainability.
Indirect impacts (co-benefits)	**Improved air quality:** Carbon-neutral buildings require very low energy for their operation resulting in limited local and centralized emissions. This can have a positive impact on public health and the environment **Reduced heat island effect:** Carbon-neutral buildings are characterized by low heat transferred to the urban space resulting in a reduction of anthropogenic heat. That is very important to limit excessive heat in urban areas, leading to lower ambient temperatures and improved urban comfort.
Governance/Policy	
Early changes (1-2 years)	**Streamlined permitting and approval processes:** Simplifying and expediting the permitting and approval processes for carbon-neutral building projects. This can be achieved by creating dedicated review teams, implementing online application systems, and providing clear guidelines to ensure a smooth and efficient process **Carbon-neutral building certification programs:** Encourage or require buildings to obtain Carbon-neutral building certifications like LEED (Leadership in Energy and Environmental Design) or BREEAM (Building Research Establishment Environmental Assessment Method) to demonstrate their commitment to sustainability and high-performance standards. **Financial support and incentive schemes**:

	Encouraging financial institutions and investors to provide favourable terms, such as loans with lower interest rates or grants, for the construction of carbon-neutral buildings. This incentivizes developers and building owners to adopt sustainable building practices.
Late outcomes (3-4 years)	**Integrated urban planning**: Promoting integrated urban planning approaches that prioritize the development of carbon-neutral buildings within the broader context of sustainable urban development. This involves coordination between different government departments, stakeholders, and urban planners to ensure that carbon-neutral building objectives are aligned with overall urban planning goals **Collaborative governance structures:** Establishing mechanisms that facilitate stakeholder engagement and decision-making processes. Based on platforms for ongoing dialogue, coordination, and accountability among stakeholders, collaborative governance enhances transparency, trust, and cooperation, enabling effective implementation and monitoring of deep renovation initiatives **Sustainable urban planning**: Developing collaborative urban planning practices, which considers all perspectives of the involved actors and stakeholders for creating sustainable, beautiful and inclusive cities. Encouraging mixed-use planning with the promotion of flexible and adaptable design of open spaces. Incorporating sustainable design practices.
Direct impacts (Emission reductions	**Reduced energy demand, needs, or consumption:** The construction of new carbon-neutral buildings will provide new built-up spaces hosting human activities, which require very low emissions. High standards for insulation, sealing air leaks, installing energy-efficient appliances and lighting systems will result in reduced energy consumption in buildings. This will lead to very low energy bills for building owners and tenants, reducing energy poverty and increasing affordability **Reduced energy poverty:** Deep renovation can yield long-term cost savings for building owners and tenants and better indoor environmental conditions, resulting in a reduction of the energy poverty exposure and of the energy-poverty related mortality. **Increased carbon sequestration**: Promote the capture and storage of carbon dioxide from the atmosphere, primarily through the growth and preservation of urban forests, green infrastructure, and other carbon-absorbing ecosystems. Increased carbon sequestration promotes biodiversity, enhances ecosystem services, and contributes to the overall goal of achieving a carbon-neutral or carbon-negative future
Indirect impacts (co-benefits)	**Enhanced physical and mental well-being, comfort and productivity:** Carbon-neutral buildings must be designed to prioritize occupant comfort and well-being. Enhanced thermal comfort, improved air quality, and reduced noise levels positively impact occupants' health, productivity, and overall quality of life. **Improved access to information, awareness & behaviour change**: Empowered individuals and communities to make informed choices. Through educational campaigns, workshops, and online platforms, information about sustainable practices is disseminated, raising awareness and promoting behaviour change towards more sustainable lifestyles. This co-benefit leads to increased environmental consciousness, responsible consumption, and active participation in sustainability efforts, ultimately contributing to the transition towards a greener and more sustainable society. **Increased number of skilled jobs & rate of employment**:

	Constructing new carbon-neutral buildings generate employment opportunities and stimulate local economic growth. Theis projects require skilled labour in construction, engineering, architecture, and energy services. These jobs can provide stable employment for the local workforce and attract investment in the Carbon-neutral building sector. Furthermore, this activity spur demand for building materials, equipment, and related services, supporting local businesses.
Social innovation	
Early changes (1-2 years)	**Community-driven initiatives:** Promoting energy-saving competitions, and awareness programs to encourage sustainable practices, such as energy conservation, waste reduction, and responsible resource use **Urban Farming Integration:** Green and carbon-neutral buildings can incorporate urban farming initiatives, such as rooftop gardens or vertical farming systems, providing fresh produce to residents and communities. These projects enhance food security, promote local agriculture, and contribute to the overall sustainability and well-being of the building occupants
Late outcomes (3-4 years)	**Affordable green housing:** Socially innovative projects aim to provide affordable housing options that incorporate Carbon-neutral building principles. These initiatives focus on energy-efficient designs, sustainable materials, and renewable energy integration, making carbon-neutral buildings more accessible to low-income communities. **Collaborative construction projects:** Socially innovative construction projects involve collaboration between developers, community organizations, and local residents. These initiatives engage community members in the construction process, providing job training, skills development, and employment opportunities, while also incorporating sustainable and energy-efficient building practices **Socially responsible real estate development:** Promoting investments in carbon-neutral buildings that provide community benefits such as affordable housing, green spaces, and community facilities, ensuring the well-being of residents and contributing to the overall social fabric of the neighbourhood
Direct impacts (Emission reductions	
Indirect impacts (co-benefits)	**Increased resilience to climate change:** Deep renovation of the building stock can make buildings more resilient to climate change by making them more resistant to extreme weather events, such as heat waves, floods, and droughts. This can help to protect property owners and the city from the negative impacts of climate change. **Increased property value and decreased future maintenance & capital costs:** Deeply renovated buildings tend to have higher market value due to their improved energy performance, lower operating costs, and alignment with sustainability standards. Building owners can command higher rents or sales prices for energy-efficient properties. Additionally, Carbon-neutral building certifications and labels can further enhance the market value and attractiveness of the renovated buildings
Democracy/Participation	
Early changes (1-2 years)	**Public awareness and engagement:**

	Launch public awareness campaigns to educate the general public about the benefits of carbon-neutral buildings, energy efficiency, and sustainability. Encourage community involvement and provide resources to empower individuals and organizations to embrace and support sustainable building practices **Carbon-neutral building networking:** Establishing national and local networks or associations dedicated to promoting carbon-neutral buildings and sustainable and successful construction practices. These networks can facilitate knowledge sharing, provide resources, and foster collaboration among industry professionals and stakeholders. **Carbon-neutral building policy advocacy:** Encouraging individuals and organizations to advocate for supportive policies at the local and national levels that support sustainable building practices and promote social equity. This can involve engaging with policymakers, attending public hearings, and participating in relevant policy discussions and require lobbying for incentives, tax breaks, and funding mechanisms to encourage the construction of Carbon-neutral buildings and ensure access for underprivileged communities
Late outcomes (3-4 years)	**Neighbourhood planning committee:** Establishing neighbourhood planning committees composed of residents, local businesses, community organizations, and government representatives. These committees can provide input and feedback on proposed carbon-neutral building projects, ensuring that they align with the community's goals, values, and needs **Community benefits agreements:** Implementing community benefits agreements that outline the specific social, economic, and environmental benefits that carbon-neutral building projects will bring to the surrounding community. These agreements are developed through consultation and negotiation with community representatives, ensuring that the projects address community priorities and concerns **Participatory budgeting:** Introducing participatory budgeting processes that allow residents to have a say in the allocation of funds towards carbon-neutral building projects. This empowers community members to make decisions regarding sustainable infrastructure investments and encourages accountability and transparency in resource allocation
Direct impacts (Emission reductions	
Indirect impacts (co-benefits)	
Finance/Funding	
Early changes (1-2 years)	**Energy Performance Contracts**: Implementing Energy Performance Contracts, where energy service companies (ESCOs) finance the upfront costs of energy-efficient building improvements. The ESCOs are repaid from the energy savings achieved over a specified period, thus enabling building owners to undertake carbon-neutral building projects without significant upfront investment. **Innovative funding and financial mechanisms:** Promoting innovative financial schemes, like Carbon-neutral building Revolving Funds, to provide low-interest loans or grants to developers, building owners, or communities, which can be repaid through energy savings generated by the energy-efficient features of the buildings and energy efficiency loans by collaborating with financial institutions to offer specialized loans tailored for carbon-neutral building projects. These loans can feature favourable terms, such as low-interest **Public-private partnerships**:

	Establishing partnerships between public bodies and private investors or companies (e.g., ESCos) to activate private capitals for constructing new Carbon-neutral buildings and zero emission neighbourhoodsrates or longer repayment periods, incentivizing developers and building owners to invest in energy-efficient features.
Late outcomes (3-4 years)	**Property Assessed Clean Energy (PACE) financing:** Introducing PACE programs that allow building owners to finance energy-efficient upgrades through property tax assessments. This mechanism enables building owners to repay the financing over a long-term period, with the assessment transferred to subsequent property owners if the building is sold **Green bonds:** Issuing green bonds to raise funds specifically for carbon-neutral building projects. These bonds attract socially and environmentally conscious investors and provide capital for the construction or retrofitting of energy-efficient buildings. The funds raised can be allocated to developers or building owners through appropriate mechanisms **Socially responsible crowdfunding platforms for co-housing:** Utilizing crowdfunding platforms to mobilize funds from a large number of individuals or small investors who provide community benefits such as affordable housing, green spaces, and community facilities, ensuring the well-being of residents and contributing to the overall social fabric of the neighbourhood. These platforms can facilitate the financing of carbon-neutral building projects, allowing individuals to contribute small amounts towards the construction or retrofitting of energy-efficient buildings and foster a sense of community, social inclusion, and environmental responsibility
Direct impacts (Emission reductions	
Indirect impacts (co-benefits)	
Learning/Capabilities	
Early changes (1-2 years)	**Capacity Building:** Invest in training and education programs for architects, engineers, contractors, and building professionals to enhance their understanding of carbon-neutral building design, construction techniques, and energy-efficient technologies. This can be done through workshops, seminars, and certification programs. **Carbon-neutral building construction competitions**: Organizing European competitions among local workforces to tackle specified construction issues for identifying best practices, and show needs for upskilling local teams **Demonstration Projects and Pilots:** Implementing demonstration projects and pilots to showcase the feasibility and benefits of new carbon-neutral buildings. These projects serve as real-world examples that illustrate the successful integration of energy-efficient technologies, renewable energy systems, and sustainable building practices. Demonstration projects also provide valuable insights and data to inform decision-making, evaluate performance, and refine approaches for future deep renovation initiatives.
Late outcomes (3-4 years)	**Monitoring and Compliance:** Implement mechanisms for monitoring and verifying the performance of carbon-neutral buildings to ensure compliance with energy efficiency standards. This can include regular audits, inspections, and performance benchmarking. **Capacity Building and Skills Enhancement:**

	Organize ad hoc training to enhance the skills of professionals involved in deep renovation projects. This includes architects, engineers, construction workers, energy auditors, and policymakers. Capacity building initiatives provide training programs, workshops, and certifications to develop the necessary expertise in sustainable building practices, energy efficiency, renewable energy integration, and advanced technologies **Carbon-neutral building Task Force or Committee:** Establishing dedicated task forces or committees composed of government officials, industry experts, and stakeholders to oversee and drive the implementation of policies and programs related to carbon-neutral buildings. These bodies can provide expertise, guidance, and coordination to ensure effective governance of sustainable building initiatives
Direct impacts (Emission reductions	
Indirect impacts (co-benefits)	
Digitalisation	
Early changes (1-2 years)	**Digital building logbook:** Adopting the EU framework for the buildings' digital logbook for "benchmarking and progress tracking of performance improvements and energy use, business planning, internal and external reporting, risk assessment and financial underwriting". **Smart-grid ready buildings:** Enabling all new buildings to be ready to interact with the local smart-grid. Smart-grid ready buildings promote energy efficiency, support renewable energy integration, and contribute to a more resilient and sustainable electricity grid.
Late outcomes (3-4 years)	**Energy flexibility market**: Building digital twins acting as agents in an interconnected energy and information network enable the establishment of an energy flexibility market that at the same time optimise the electricity capacity available over the time providing opportunity to building owner to have a cost benefit.
Direct impacts (Emission reductions)	
Indirect impacts (co-benefits)	

B1.1.4: Impact Pathways Transport and Mobility

Technology/Infrastructure	
Early changes (1-2 years)	Upgrade of bus stops Construction of a section of cycle lanes Provision of street trees

	Provision of street benches and street furniture Upgrade of pedestrian crossings into 'Pelican' Provision of essential charging stations Electrify a portion of buses Construction of transportation centers Construction of park and ride locations Incorporate smart technologies in bus stops Implement carpooling school-related transportation (metaCAZZE project)
Late outcomes (3-4 years)	Increase public transportation modal split Construction of additional cycle lanes User incentives for bike-sharing use Provide shared e-bikes (metaCAZZE project) Construction of state-of-the-art pedestrian lanes Provision of the rest of charging stations Electrification of bus fleet Electrification of Municipal fleet Construction of mobility hubs Installation and provision of ITS services in the transportation system Convert crossings to smart crossings Signalize and synchronize roundabouts
Governance/Policy	
Early changes (1-2 years)	Regulatory framework for user incentives Implement initiatives derived from Limassol SUMP Regulatory framework for contracts of public transportation providers Revise Local Plan to enhance bike-lanes and pedestrian networks Revise streetscape manual to provide shading within bike-lanes and pedestrian networks Integrate transportation planning with land use
Late outcomes (3-4 years)	
Social innovation	
Early changes (1-2 years)	Limassol is a leading living lab (metaCAZZE project) Community engagement Awareness campaigns for benefits of sustainable transportation technologies
Late outcomes (3-4 years)	
Democracy/Participation	

Early changes (1-2 years)	Open data initiatives making transportation-related data publicly available Pilots for participatory planning (e.g., living lab) Ensure user-centric service improvements
Late outcomes (3-4 years)	
Finance/Funding	
Early changes (1-2 years)	New opportunities for private investors Provide subsidies to users to use micro-mobility services Establish green freight funding programs
Late outcomes (3-4 years)	
Learning/Capabilities	
Early changes (1-2 years)	Knowledge sharing between academia, industry and public agencies Pilot projects (e.g., metaCAZZE, 30kmh zone)
Late outcomes (3-4 years)	Data-driven decision making by evaluating impact of early changes Continuous monitoring and evaluation
Impacts	
Direct impacts (Emission reductions	GHG Emissions Reductions (reduce emissions by ~144,000tCO2 by 2030) Modal split of public transportation reaches over 20% by 2030 Modal split of micro-mobility services reaches over 10% by 2030 More than 5% of total passenger kms on foot by 2030 More than 45% of internal combustion vehicles are replaced by electric vehicles fueled by renewable energy sources
Indirect impacts (co-benefits)	Enhanced public health Improved air quality Noise pollution reduction Improved well-being Enhanced urban livability Job creation (local), economic growth, learning new employment skills Accomplish societal and environmental benefits leading to transportation fairness

B-1.1.5: Impact Pathways Sustainable Municipal Solid Waste (MSW) Management; Circular Economy; Zero Waste

Technology/Infrastructure	
Early changes (1-2 years)	**Waste segregation to remove the organic fraction:**

	Currently, organic waste is landfilled resulting to high GHG emissions. Pilot projects aim in collecting 30% of the organic waste produced annually, to be scaled up to remove >90% of the organic fraction by 2030. Organic waste will be collected separately in selected areas of the city (e.g., 30 km zone) and will be transfered to existing facilities, where i twill be used for anaerobic digestion and electricity production. **Technology integration at the neighbourhood level**: Waste segregation at household level does not require special technology changes, but ratehr a re-organization of the collection system schedule at the city level. Currently, PMD and MSW are collected separately, but a need for a separate collection of the organic material will arise. **Pilot projects for Zero Emission waste management**: Pilot projects will start in selected areas of the city in order to establish MSW segregation. We plan to begin with separating organic waste and aim to maximize separate collection of recyclable materials. All this will be done in line with the principles of Circular Economy (and waste management).
Late outcomes (3-4 years)	**Infrastructure upgrade:** Following separate organic material collection, the target should be to maximize the removal of recyclable materials. Implementation of the « Pay as you throw » principle will be pivotal in achieving this goal. According to this principle, each household has an ID (barcode) related to their waste bin and the annual municipal household fee for waste management is not fixed (as it is right now) but depends on the amount of waste produced.
Direct impacts (Emission reductions)	**Reduced GHG emissions:** Implementation of this action will contribute to the reduction of the GHG emissions produced by landfilling the organic fraction of the MSW. Lemesos also has a great potential for removing of the recyclable fraction from the MSW. The action is in accordance with EU guidelines and directives for sustainable solid waste management (and many others related to sustainable environmental management).
Indirect impacts (co-benefits)	**Reducing environmental pollution and producing renewable energy:** Landfills contribute to environmental pollution, not only with GHG emissions, but also with the release of leachate and odours which are problematic for nearby communities. Sustainable MSW management will contribute to minimizing these issues and instead will be used to produce renewable energy from organic waste using anaerobic digestion. One of the added benefits from this, is that the emission factor from this source of energy is much lower than the one of current system used for electricity production in Cyprus.
Governance/Policy	
Early changes (1-2 years)	**Circular Economy**: The principles of circular economy will be incorporated in existing policies related to waste management. This action is pivotal not only for Lemesos but for the entire country. **Update of MSW policies for NZC**: Review and update (municipal) policies related to MSW collection and handling (e.g., avoid landfilling, increase recycling, increase reusing). **“Pay as you throw”**: Design an action plan for the implementation of the “pay as you throw” principle, according to EU waste management guidelines and national law.

Late outcomes (3-4 years)	**Policy for Zero Waste in Lemesos**: There is an urgent need for a zero waste policy in Lemesos (and Cyprus) according to the EU Waste directives in order to minimize landfilled MSW. The NZC will support this transition. The Municipality plans to support other municipalities and smaller communities (e.g., villages) in Lemesos district, where the conditions of MSW treatments are much worse (e.g., existence of wastelands and open damp sites). **Collaborative governance structures:** Waste management is transdisciplinary and requires stakeholders' involvement and engagement. The mission supports collaboration towards MSW sustainable management based on platforms for ongoing dialogue, among stakeholders, collaborative governance enhances transparency, trust, and cooperation. Citizen involvement is also crucial (e.g., pay as you throw) in this operation and platforms such as the "Lemesos Commons" and e-platforms will facilitate a continuous dialoge platform among citizens, the municipality and other stakeholders. **Sustainable urban planning**: In line with other Mission Thematics (e.g., transportation, buildings, green infrastructure), Zero Waste is related to developing collaborative sustainable urban planning practices.
Direct impacts (Emission reductions)	**Decreased rate of waste production:** Applying zero waste approach (e.g., reuse, reduce, recycle) supports reduced waste production. This will result in reduced GHG emissions which are currently coused by the current and outdated MSW management system.
Indirect impacts (co-benefits)	**Reduced pollution related to solid waste:** On the long term, sustainable solid waste management supports several EU strategies related to human and environmental health (e.g., One Health; Soil; Biodiversity; Green Deal).
Social innovation	
Early changes (1-2 years)	**Collaborative platforms:** Creating collaborative platforms to raise awareness, share best practices, and provide technical assistance on topics related to sustainable MSW (segregation, reduce, reuse etc.). **Training programs**: Developing targeted training programmes for skilling, upskilling, reskilling professionals involved in waste management schemes, fostering a skilled workforce **No one left behind principle**: Establish mechanisms to ensure that all stakeholders and citizen groups are involved in the "zero-waste effort" in Lemesos.
Late outcomes (3-4 years)	**Education and awareness campaigns**: Promoting behavioural change among citizens by establishing education and awareness campaigns and by establishing the "Lemesos Commons" and the related Co-workshops (co-design solutions). **Community-driven initiatives:** Promoting competitions, and awareness programs to encourage sustainable practices, waste reduction and responsible resource use. **Centre of Information**: Establish a municipal Center of information, where individuals and stakeholders could access info related to opportunities for sustainable waste management (e.g., donate, refurbish, reuse).

Direct impacts (Emission reductions)	**Reduced consumption; avoid food waste:** Sustainable MSW leads to abandoning the linear model "buy-use-throw" which is also related to increased GHG emissions and climate change. Food waste reduction is highly related to social innovation (donate; educate consumers).
Indirect impacts (co-benefits)	**Enhanced well-being and sense of place:** Minimizing environmental pollution from waste supports public health and citizens are proud for their neighbourhoods/community/city.
Democracy/Participation	
Early changes (1-2 years)	**Stakeholder engagement**: Creating mechanisms to incorporate different opinions and expertise in municipal decision-making procedures, related to waste management, by engaging citizens, tenants, professionals, companies, public servants, and other relevant stakeholders. **Participatory city redesign**: Waste management is key to city aesthetics and function. Identifying relevant bodies and establishing mechanisms to enable citizens and civil society to co-design waste management (e.g., composting, reuse, reduce waste, recycle). **Green Economy and Innovation Observatory**: Establishing an Observatory for Green Economy and innovation to promote transparency related to funding, incentive schemes and green job opportunities.
Late outcomes (3-4 years)	**Multi-stakeholder engagement:** Sustainable MSW management involves engaging a wide range of stakeholders, including government agencies, building owners, tenants, companies, industry, and community. The outcome is enhanced multi-stakeholder engagement, ensuring that diverse perspectives, expertise, and resources are leveraged to drive the circular economy agenda. This inclusive approach facilitates collaboration, knowledge-sharing, and collective decision-making. **Community participation and empowerment:** Emphasis is given to community participation and empowerment in circular economy related projects. Local residents are engaged in the decision-making process, by encouraging them to take an active role in shaping the waste reduction strategies. Participatory approaches, such as community meetings, workshops, and focus groups, enable community members to express their needs, priorities, and aspirations. This involvement instils a sense of ownership and empowers communities to drive sustainable change. **Social equity and inclusion:** This outcome is related to the engagement of marginalized groups, low-income communities, and vulnerable populations in circular economy projects and green job prospects. By prioritizing their needs and perspectives, sustainable MSW management has higher probability for success.
Direct impacts (Emission reductions)	**Reduced waste (and related emissions):** Multistakeholder approaches and community based solutions have higher prospects for success, which ultimately leads to waste reduction and GHG emissions mitigation.
Indirect impacts (co-benefits)	**Sense of place/ aesthetics:** Sustainable waste management with active involvement of citizens and stakeholders has positive impact on the cooperation and collaboration (bottom up) and city aesthetics (and brand name). It enhances the overall quality of life for residents and visitors.
Finance/Funding	

Early changes (1-2 years)	**Targeted financial mechanisms:** Establishing financial mechanisms for the municipality (e.g., grants, incentives to contractors, low-interest loans) to facilitate the cost-effective implementation of sustainable solid waste management in Lemesos. **Public-private partnerships**: Establishing partnerships between public bodies and private investors or companies (e.g., corporate social responsibility) to activate private capitals for enabling transition to zero waste via small community projects (e.g., composting, reuse).
Late outcomes (3-4 years)	**Increased financial resources**: Mobilizing increased financial resources for MSW management. This involves leveraging public funding sources, including government budgets, grants, philanthropic contributions, and investment from financial institutions. By securing additional financial resources, the sustainable solid waste management can be scaled up and accelerated (e.g., separate collection of >90% of organics; recycling rate >75%). **Risk mitigation strategies**: Developing risk mitigation strategies to address financial uncertainties and risks associated with sustainable solid waste management.
Direct impacts (Emission reductions)	**Electricity production:** Producing electricity from waste supports reducing the cost for electricity at the household and municipality levels and has positive impact to GHG emissions mitigation.
Indirect impacts (co-benefits)	**Improved access to information, awareness & behaviour change**: Empowers individuals and communities to make informed choices (e.g., responsible consumption, and active participation in sustainability efforts). Transition to green and sustainable society (green jobs, reduction of health care costs). **"Waste to money"**: Educate for fighting over-consumption has a positive benefit for households. Approx. 1000 euros per households annually are related to food waste in Cyprus (LIFE FOODPRINT).
Learning/Capabilities	
Early changes (1-2 years)	**Data collection:** Establishing a robust data collection system on different aspects of the waste management system (reduce, reuse, waste composition, recycling rates, renewable energy potential) and its relation to GHG emissions and environmental / human health. **Informative campaigns**: Promoting informative campaigns for citizens to provide information on motivation, purpose, scope of the action and related technological infrastructures and components, policies financial subsidies, behavioural change. **Demonstration Projects and Pilots:** Implementing demonstration projects and pilots to showcase the feasibility and benefits of circular economy and sustainable municipal solid waste management. These projects serve as real-world examples that illustrate the successful integration of circular economy aspects. Demonstration projects also provide valuable insights and data to inform decision-making, evaluate performance, and refine approaches for zero waste in Lemesos and beyond.
Late outcomes (3-4 years)	**Continuous monitoring and evaluation:**

	Establishing MEL (continuous monitoring, evaluation, and learning) mechanisms to assess the performance and impact of sustainable waste management. This includes tracking material and energy savings, greenhouse gas emissions reductions, cost-effectiveness and overall sustainability outcomes. **Capacity building and skills enhancement:** Enhancing the skills of professionals. Capacity building initiatives provide training programs, workshops, and certifications to develop the necessary expertise in sustainable waste management, systems development and operation, alternative energy production, renewable energy and advanced technologies **Future citizens:** Establishing programs to inform, communicate and involve the future citizens (youth) in the city sustainability model, in primary and secondary schools
Direct impacts (Emission reductions	**Education/train/learn/MEL:** Training towards sustainable MSW and circular economy leads to implementation and upscaling of the pilot projects for MSW sustainable management and circular economy, which effectively leads to GHG emissions mitigation.
Indirect impacts (co-benefits)	**Increased number of skilled jobs & rate of employment**: Zero Waste and Circular Economy stimulate local economic growth. These approaches yield interventions and projects that require skilled labour in green economy, engineering, environment and energy. These jobs can provide stable employment for the local workforce and attract investment in the Carbon-neutral concept of the NZC. Furthermore, circular economy activities spur demand for materials, equipment, and related services, supporting local businesses which need to adjust their role towards NZC concepts.
	Digitalisation
Early changes (1-2 years)	**Digital platform:** Developing a city-wide digital platform to integrate waste management digital twins. This also requires smart monitoring of waste production rates and waste composition.
Late outcomes (3-4 years)	**Digitalisation of the waste management system**: Documentation of all waste streams (e.g., organic, PMD, metals, green), locations and handling processes (e.g., anaerobic digestion, storage, bulk, batteries, cooking oils, toxic etc).
Direct impacts (Emission reductions)	**Waste streams:** Waste streams generation and treatment yield GHG emissions. Close monitoring reveals opportunities for waste reduction and efficient collection/treatment. This supports GHG emissions mitigation.
Indirect impacts (co-benefits)	**Efficient management:** Increased efficiency in waste management and opportunity of testing different management scenarios and plans. **Increased resilience to climate change:** Deep knowledge on complex systems such as the waste management system can increase resilience to climate change. **Increased property value and decreased future maintenance & capital costs:** An efficient and SMART solid waste management system removes negative aspects of waste (pollution, odours) and enhances the monetary value of assets.

B-1.2: Description of impact pathways– textual and visual elements

LIMASSOL MAPS-AREAS OF INTEREST

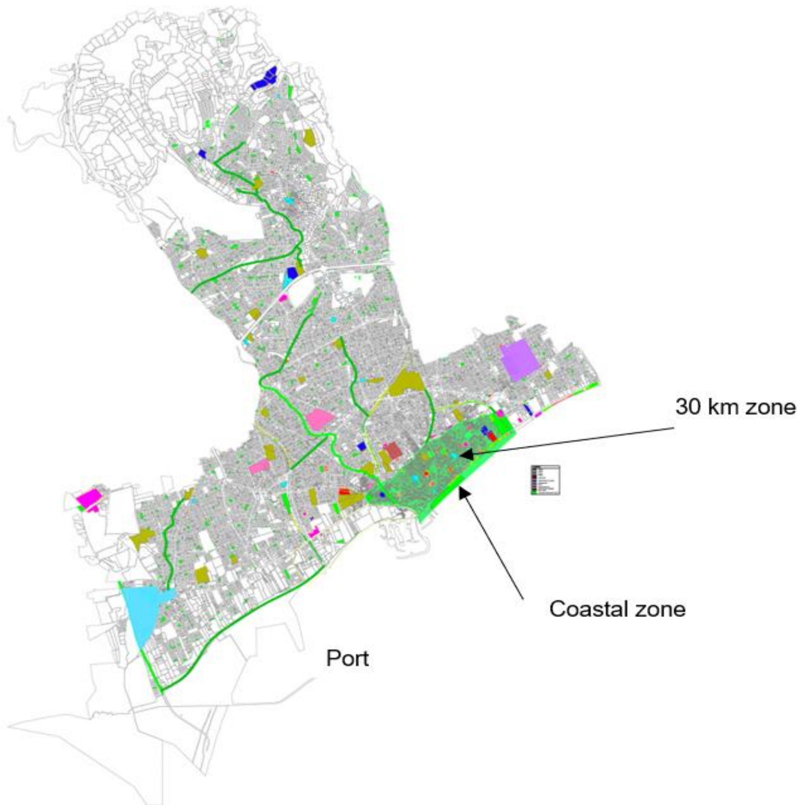


Figure 11. Map of the Limassol municipality including various areas of interest

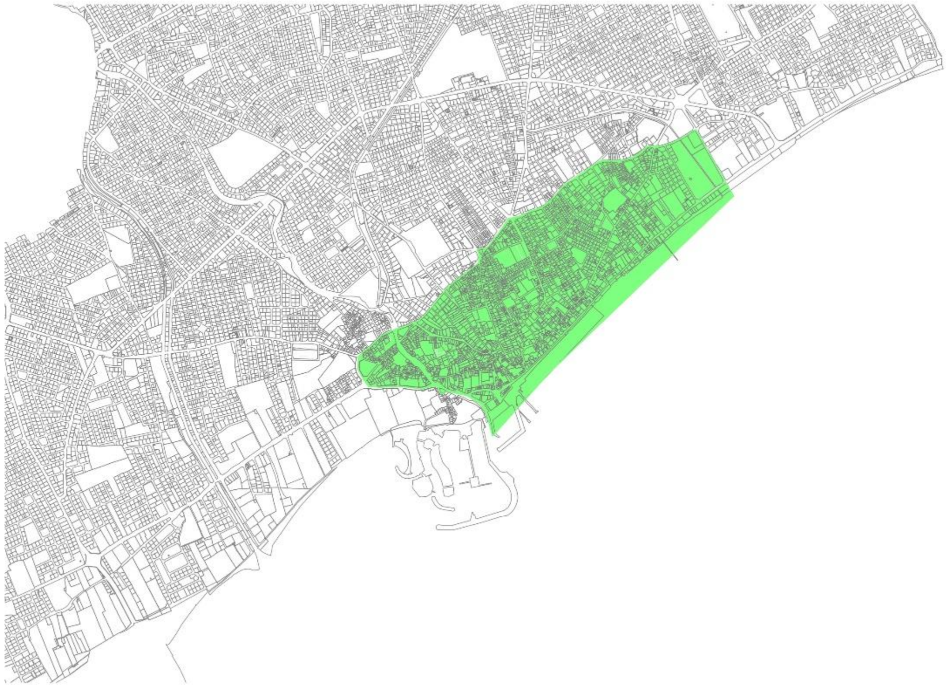


Figure 12. Map of the 30 km/h zone area; pilot area for mission interventions

Figure 13. Map denoting the Carenaggio district; pilot area for mission interventions

Figure 14. Map of green urban network with green corridors in the Limassol Municipality

ENERGY SYSTEMS

Energy is a central and, in many cases, horizontal activity that cuts across all thematic areas. This is why in the figure below the emissions domains (that happen to coincide with the thematic areas as defined in this exercise for Limassol) are all included. In addition, all thematic levers are relevant, prominently the technology/infrastructure lever, but also the others mainly through the energy community action (see tables in next section).

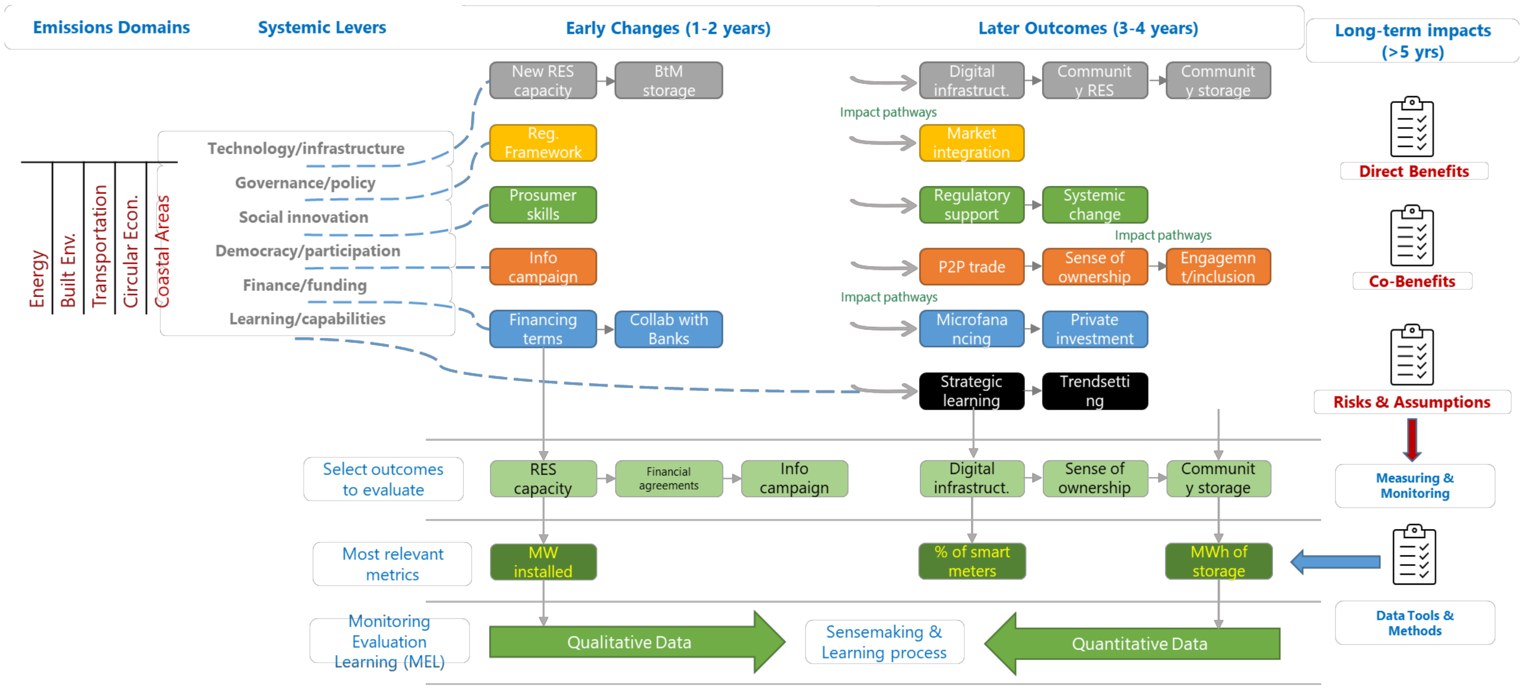


Figure 15. The impact pathways of Energy

BUILDINGS

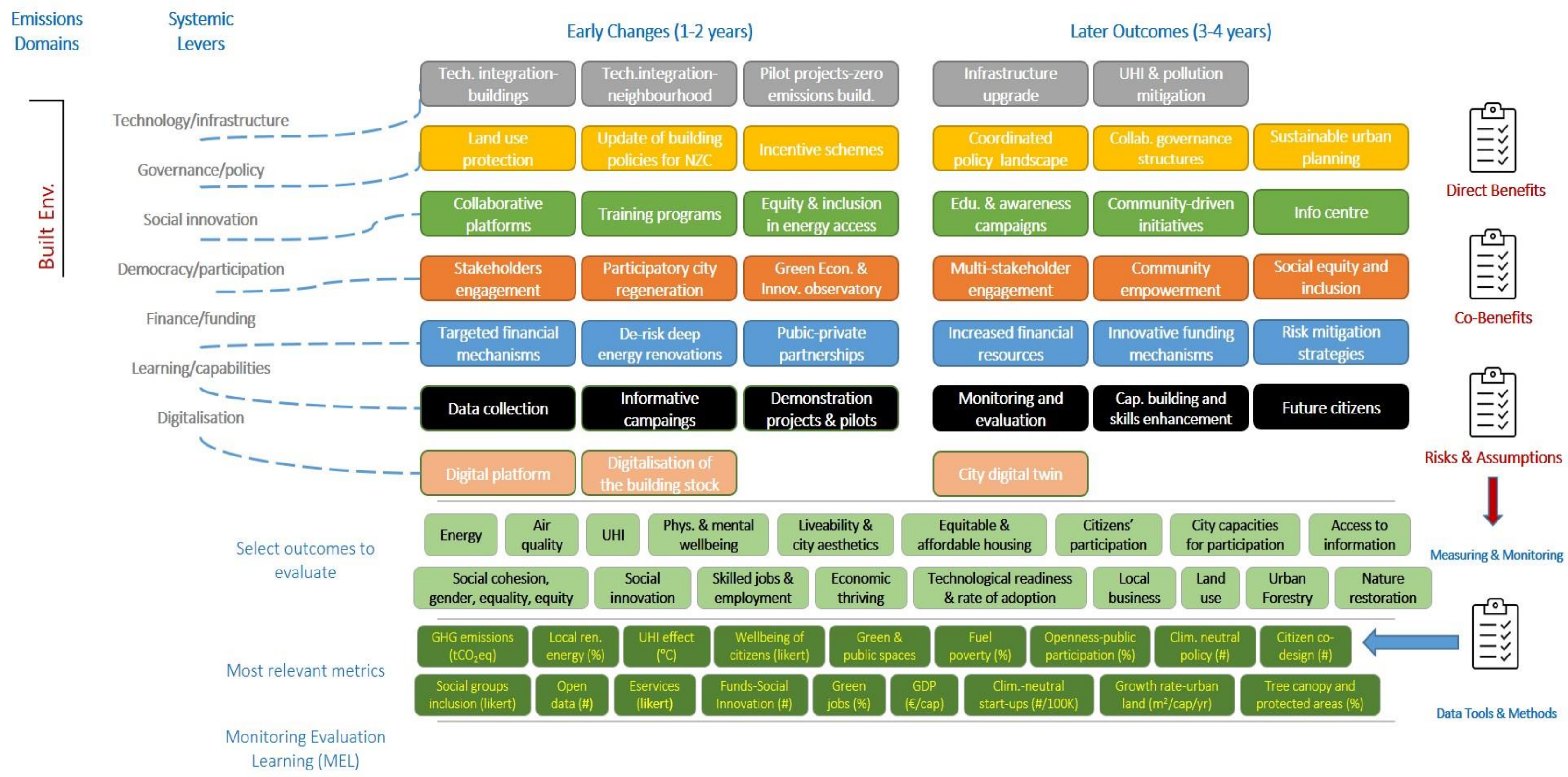


Figure 16. Deep Energy Refurbishment of the Building Stock and Urban regeneration impact pathways

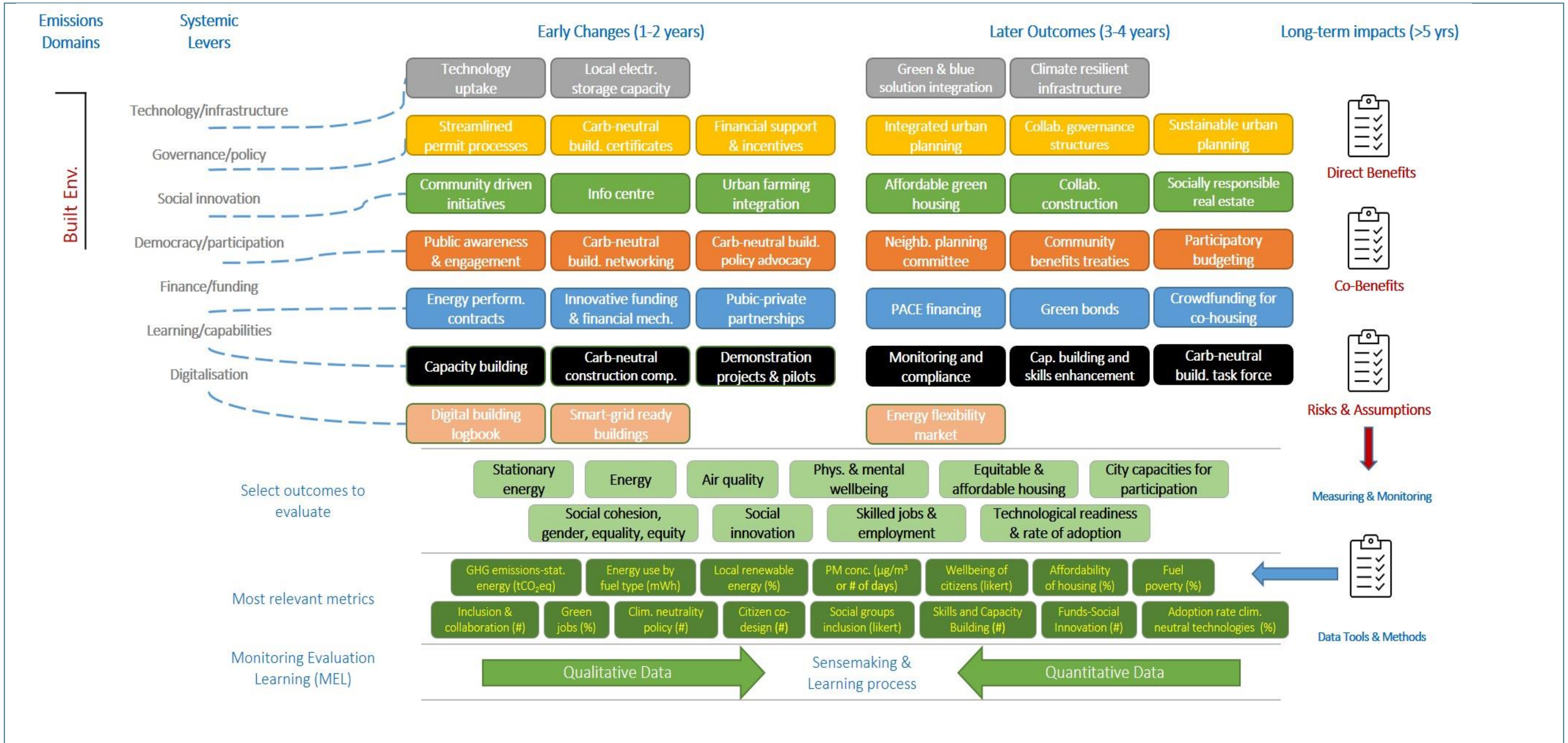


Figure 17. Construction of New Buildings impact pathways

MOBILITY AND TRANSPORT

Mobility and Transport is comprised of a portfolio of actions, which correspond to horizontal activities during the duration of the project. This phenomenon is illustrated in the following figures, where the rest of the thematic areas compliment the portfolio of actions suggested under the mobility and transport domain.

There are several Municipality-driven initiatives that include a 30km/h zone and neighbourhoods that are aligned with the framework of 15-min cities that are located close to the city center of Limassol Municipality. The early changes of actions (not limited for the thematic area of mobility and transport) are proposed to be implemented within the innovation zone (30 km/h zone) depicted in Figure 12.

In a nutshell, the actions for the thematic area of mobility and transport are:

1. Implementation of public transportation strategies that aim to boost the modal split of public transportation over 20% by 2030. The changes in the public transportation network will also include infrastructure upgrading of the bus stops within Limassol Municipality
2. Strategies enhancing micro-mobility modal split over 10% by 2030 that include infrastructure cost of creating 36 km of bike lanes (that include around 50 street trees per km) and the user cost that incentivizes people to use shared micro-mobility services (subsidizing 11% of trip).
3. Development of comprehensive pedestrian network that include state-of-the-art pedestrianized streets of more than 5km (including shading, street furniture) and the upgrading of signalized junctions into safe pedestrian crossings “PELICAN” as a means to increase the road safety level and perception.
4. Establishment of vehicle electrification strategies in the form of providing over 170 charging stations within Limassol Municipality that aim to address the conversion of more than 45% internal-combustion engine vehicles to electric vehicles. Further, it includes the 100% conversion of the bus fleet to electric by 2030.
5. Strategies improving the efficiency of freight transportation by constructing 8 transportation centers within Limassol Municipality, while also converting garbage trucks and Municipal fleet to electric
6. Optimization of transportation demand (TDM strategies) that include the construction of 5 park and ride locations, the installation of 5 mobility hubs in strategic locations within Limassol Municipality and the design and operation of a platform that controls TDM strategies.
7. Incorporation of smart technologies in sustainable transportation strategies that includes the smart upgrading of bus stops within Limassol municipality, the signalization of 5 roundabouts to form a corridor of signalized roundabouts for more efficient control of traffic, the smart upgrading of crossings and a cost allocated for ITS equipment.

Visual elements of the portfolio of actions under mobility and transport follow.

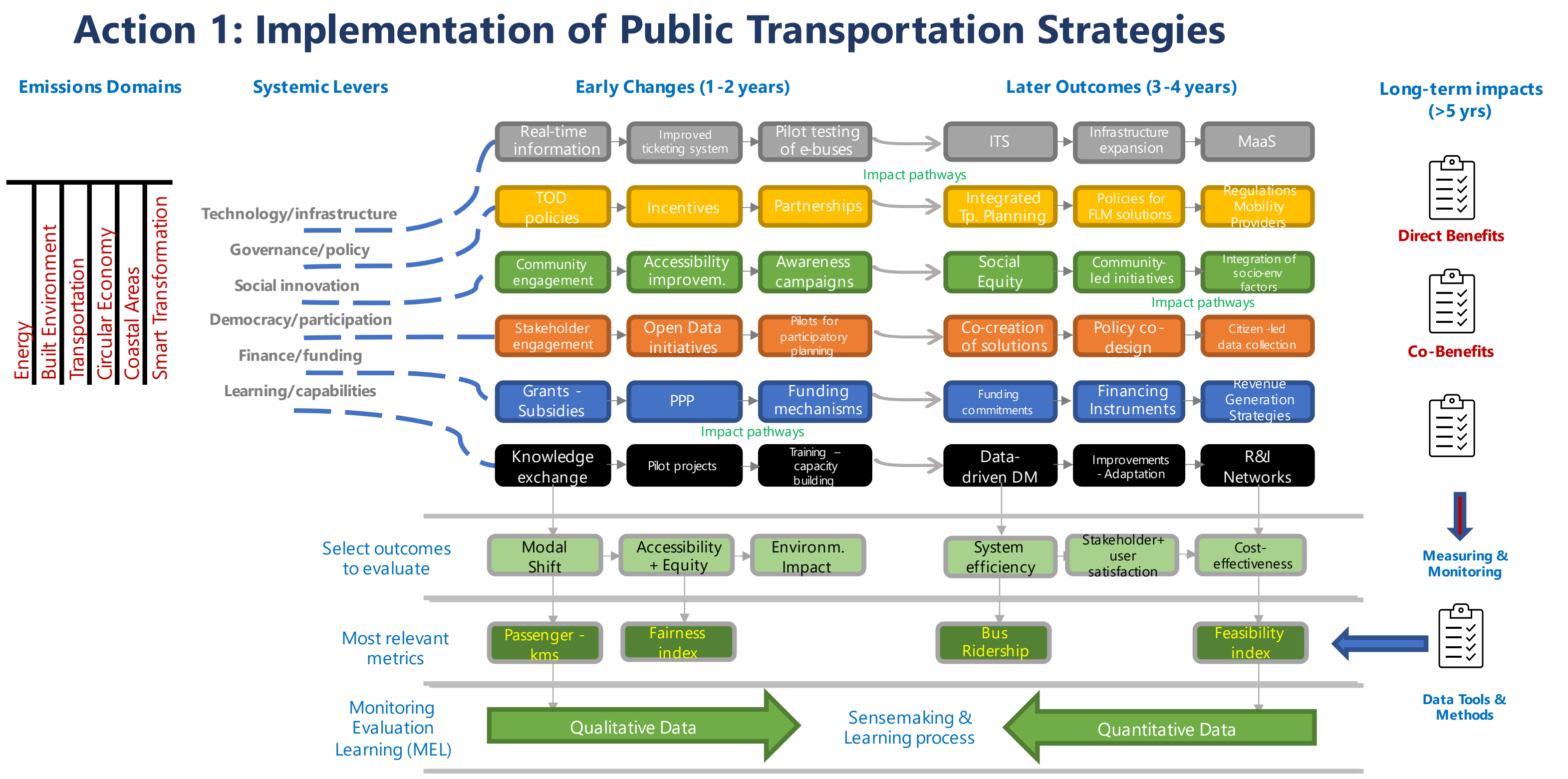


Figure 18. Implementation of public transportation strategies impact pathway

Action 2: Strategies Enhancing Micro-mobility Modal Split

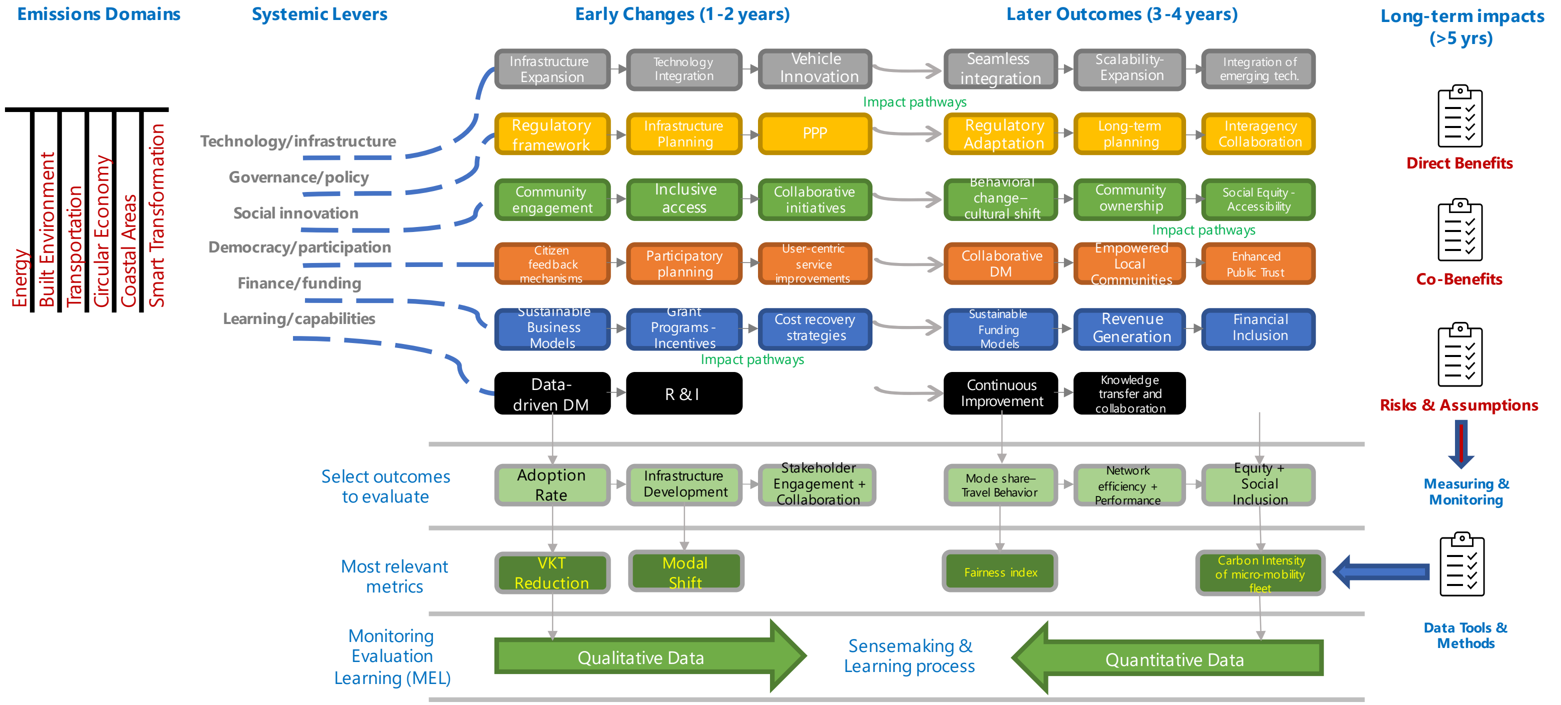


Figure 19. Enhancing micromobility modal split impact pathway

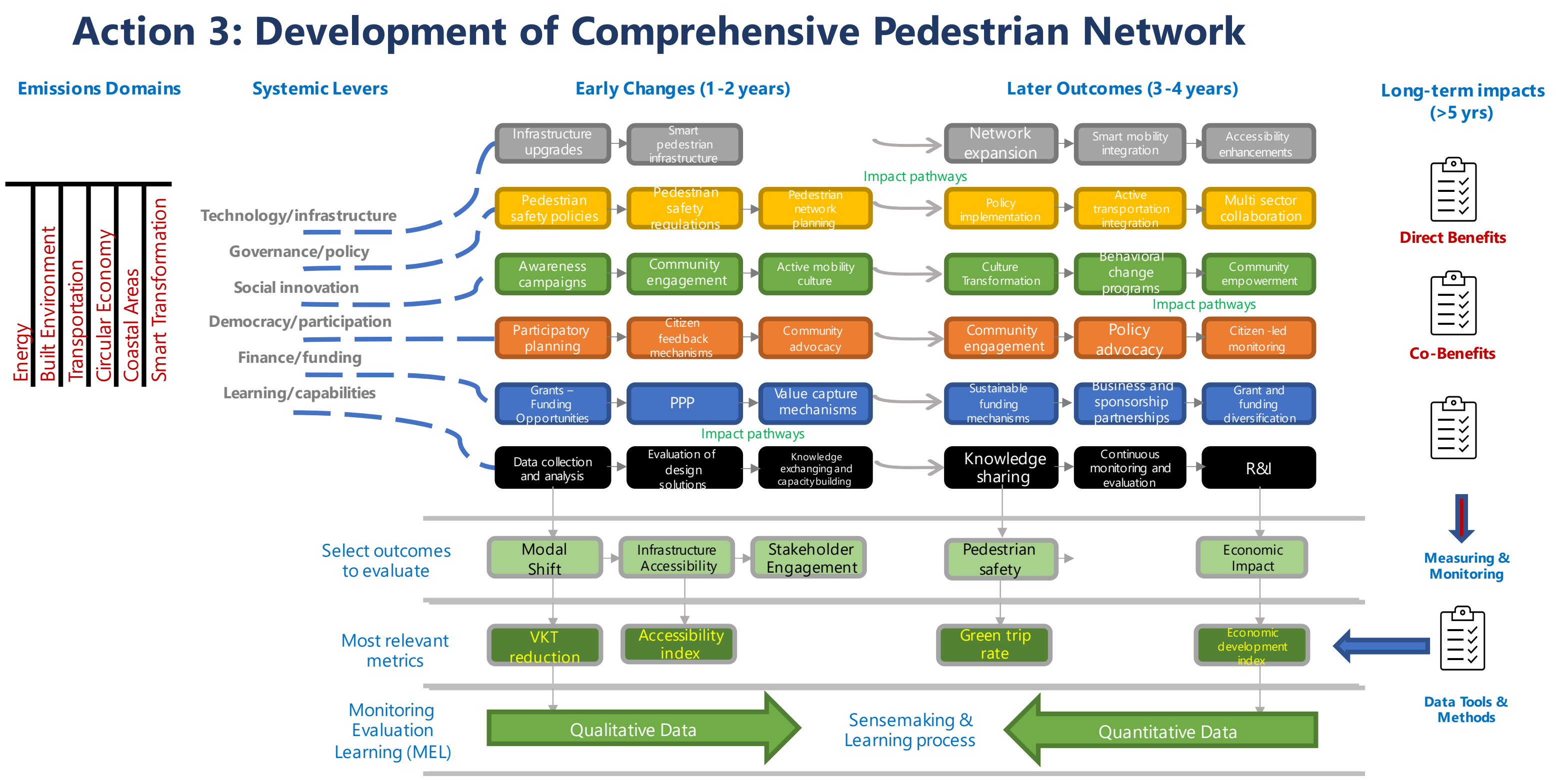


Figure 20. Development of a comprehensive pedestrican network impact pathway

Action 4: Establishment of Vehicle Electrification Strategies

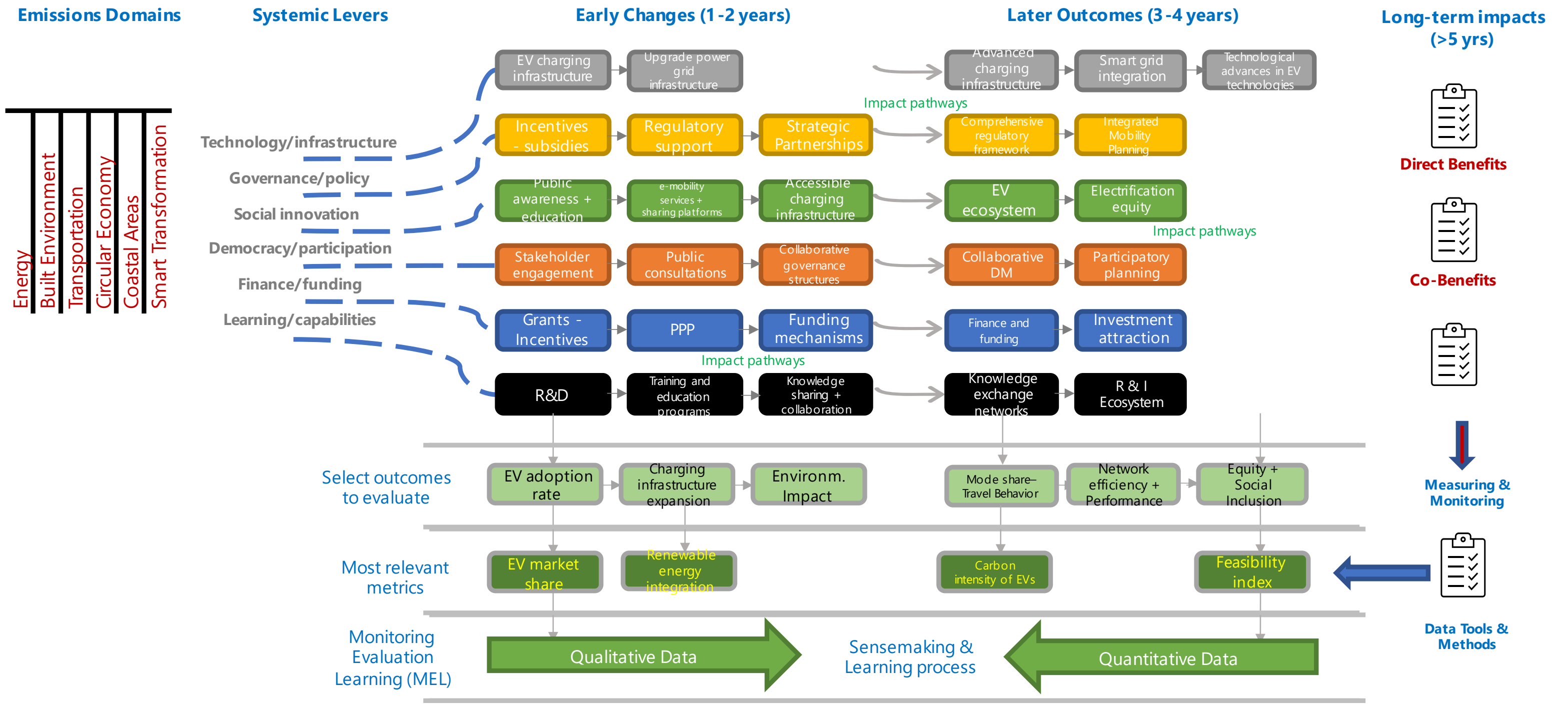


Figure 21. Establishment of Implementation of vehicle electrification strategies impact pathway

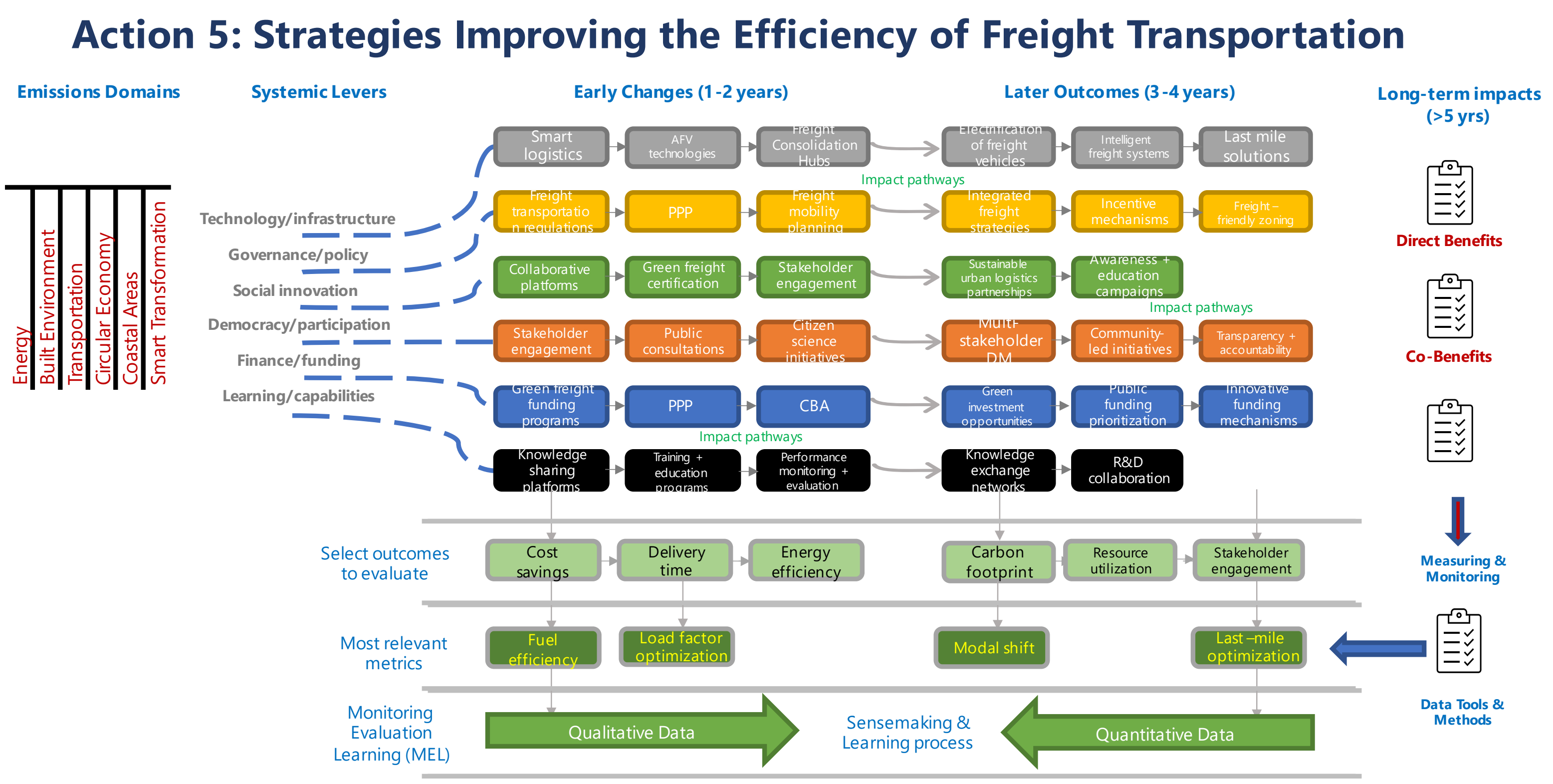


Figure 22. Improving the efficiency of freight transportation strategies impact pathway

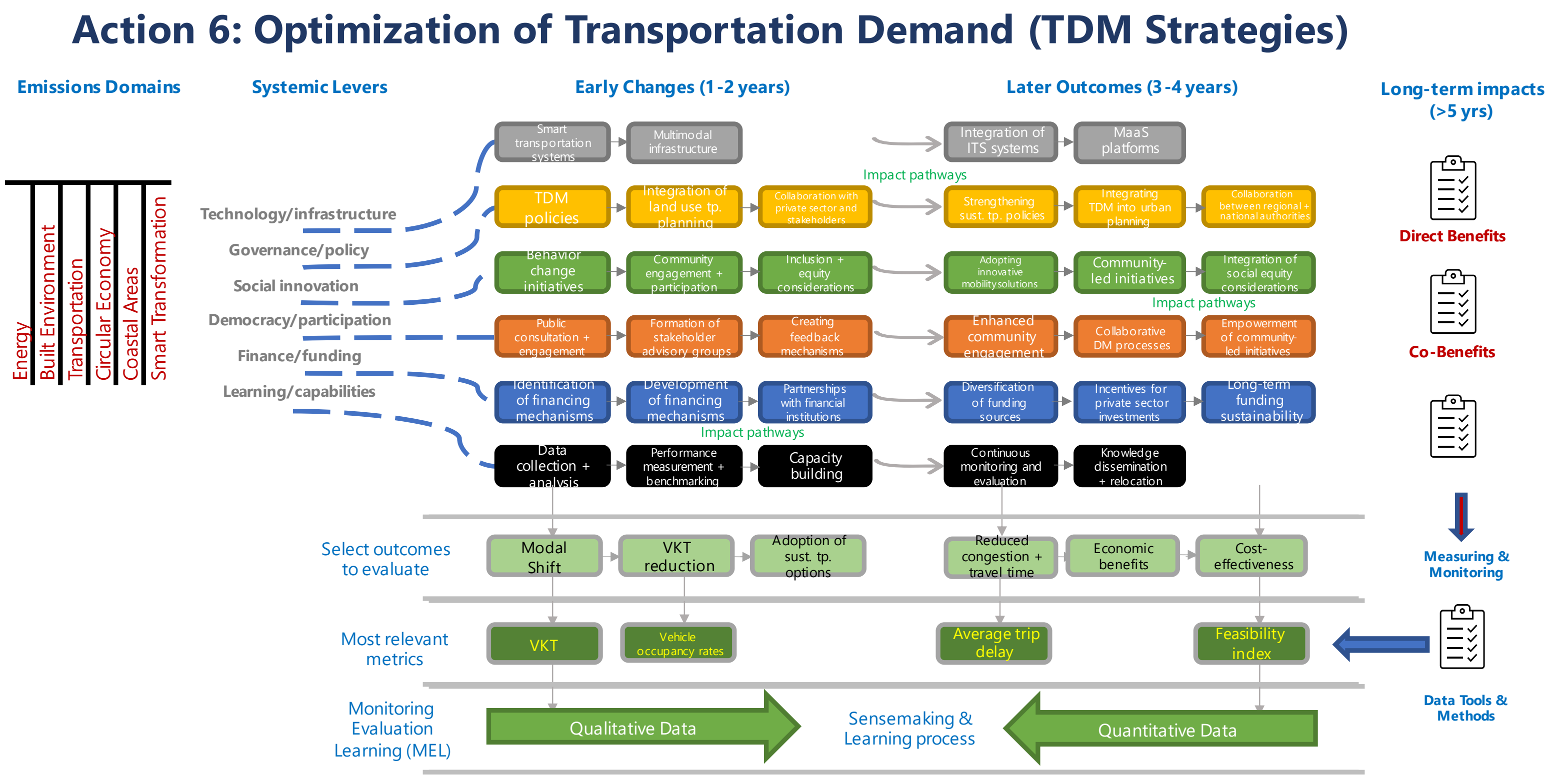


Figure 23. Optimization of transport demand (TDM strategies) impact pathway

Action 7: Incorporation of Smart Technologies in Sustainable Transportation Strategies

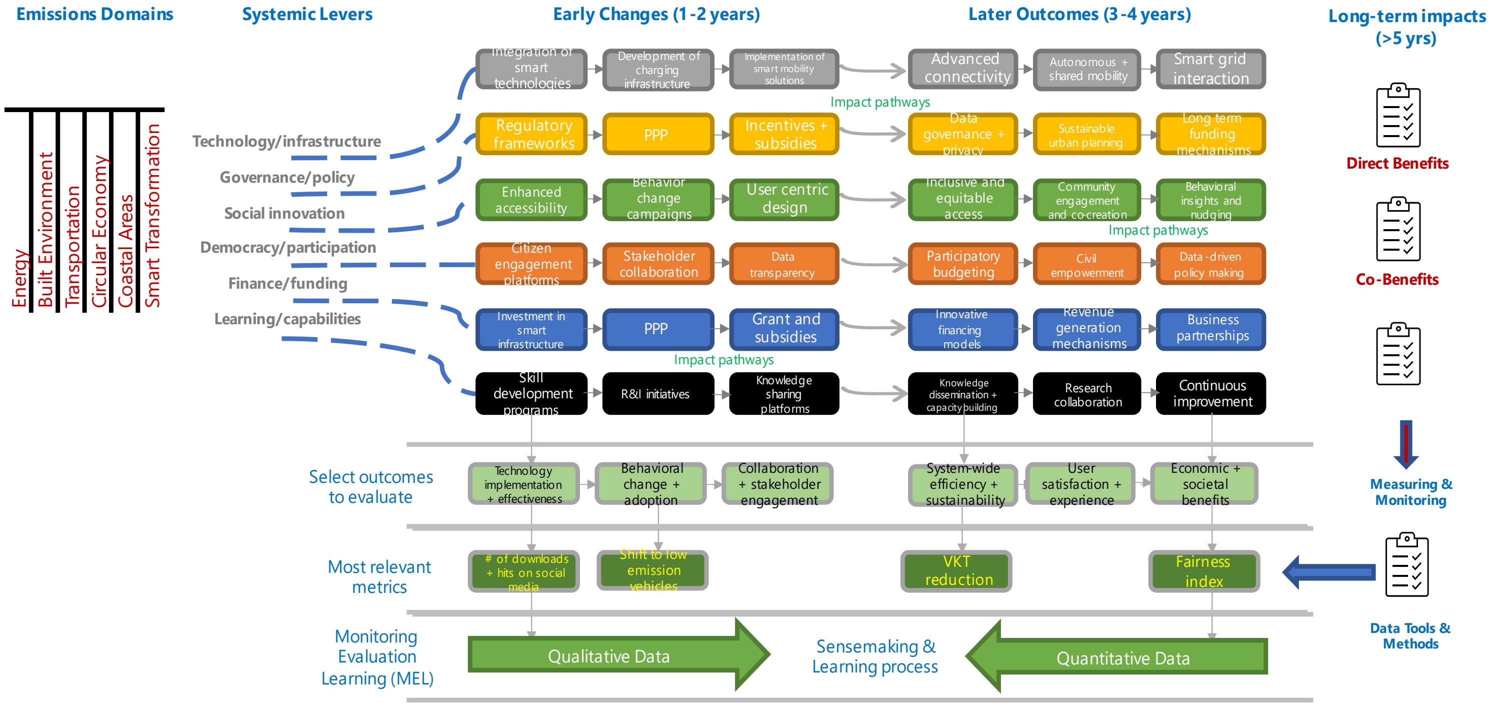


Figure 24. Incorporation of smart technologies in sustainable transportation strategies impact pathway

SUSTAINABLE MUNICIPAL SOLID WASTE (MSW) MANAGEMENT; CIRCULAR ECONOMY; ZERO WASTE

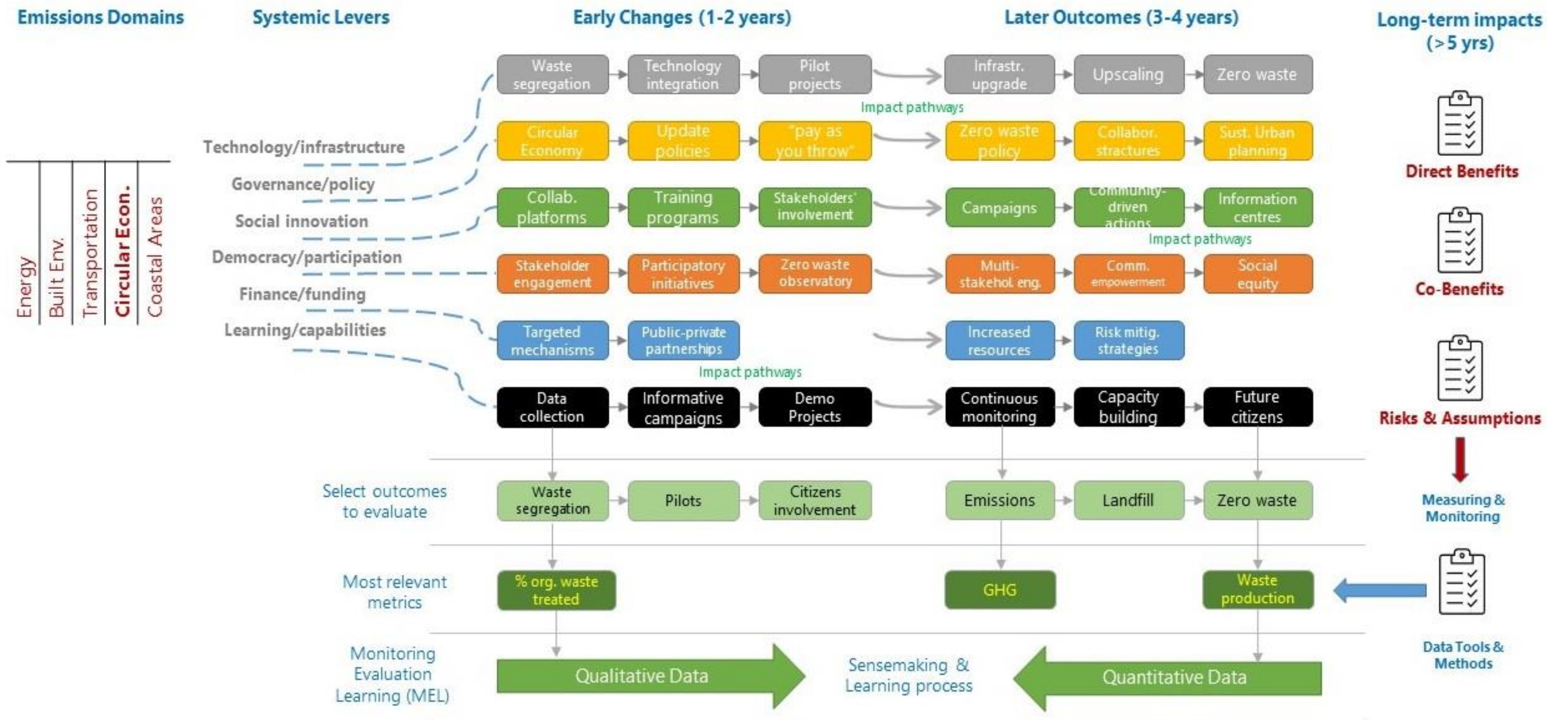


Figure 25. Sustainable municipal solid waste (MSW) management ; circular economy; zero waste impact pathway

COASTAL AND SEA

1.Cold Ironing Implementation in Limassol Port (CA_1: Cold Ironing in the Limassol Port)

Introduction
Cold ironing or the provision of shore-side electricity to ships for the Limassol Port is a transformative initiative with a significant impact on both the environment and the local community. It is the practice of providing electrical power to ships at berth as an alternative to using their onboard diesel generators and aims to reduce emissions, improve air quality, and create a sustainable future for the port and its surroundings.

The legislative framework
The EU Directive 2014/94 which focuses on the deployment of alternative fuels infrastructure, includes provisions related to cold ironing, or shore-side electricity, for reducing emissions from ships at berth. The directive encourages member states to assess the potential for cold ironing in their ports, develop infrastructure accordingly, and sets requirements for the provision of shore-side electricity facilities, aiming to reduce the environmental impact in the maritime sector. In addition, fleet operators are obliged to provide information on their fuel consumption when enteringa European port (European Union's Monitoring, Reporting, and Verification (MRV) Regulation). Specifically, the MRV Regulation, requires ships of 5,000 gross tonnage or above to monitor and report their CO2 emissions, fuel consumption, and other relevant parameters for voyages to, from, and between European ports. Data collected is verified and reported annually to the European Commission. The MRV Regulation aims to enhance the transparency of greenhouse gas emissions from the maritime sector and facilitate the development of policies and measures to reduce emissions in line with the European Union's climate goals.As of 1 January 2023, requirements for EEXI (Energy Efficiency Existing Ship Index) and CII (Carbon Intensity Indicator) certification have been implemented. This will allow shipowners to report their progress on emission reduction efforts and help fleet management measure the carbon emissions per unit of transportation activity and track and analyse the environmental impact of their fleet operations, and make informed decisions to implement strategies for carbon emissions reductions.European ports have offered various incentives to encourage ship operators to utilize cold ironing, including significant reductions in port dues, by implementing environmental schemes based on environmental indexes or certifications such as the Energy Efficiency Design Index (EEDI), Environmental Ship Index (ESI), Green Award (European Commission, 2017).

The impact pathway
The main direct impact of cold ironing is a significant reduction in GHG emissions, particulate matter, sulfur dioxide, and nitrogen oxides. This reduction in air pollution aso has significand indirect effects, or co-benefits, such as a positive impact on the health and well-being of the local community. Implementation of cold ironing and provide the Limassol Port with the opportunity to become an example of an environmentally responsible maritime operation, setting a precedent for other ports in the region and beyond, and encouraging them to adopt similar practices. Implementation of this action also has significant economic implications, as the Limassol Port is likely to attract environmentally conscious shipping companies and cruise lines and has the potential to enhance its competitiveness, attracting more vessels, generating increased revenue, and boosting local economic growth by creating new employment opportunities in the sector (and their respective ripple effect) in other sectors.

Impacts of cold-ironing implementation at the Limassol Port
- Reduction of GHG emissions
- Improved air quality
- Improvement of health of the local community
- Increased revenue for the port from increased traffic
- Stimulation of economic growth in the local community.
- Creation of new jobs for skilled workers

- Creation of new jobs in other service sectors (such as hospitality, transportation, and logistics) due to increased economic activity at the port
- Opportunity to set an example for the region

2. Carbon Neutrality in Blue Infrastructure-The case of Limassol Marina (CA_2: Limassol Marina energy community)

Blue infrastructure within cities, consists of complex systems like marinas and ports, which facilitate different needs and stakeholders, at sea, onshore or both. The Limassol Marina in particular, includes a wide range of amenities and activities such as properties (apartments, villas), Yachting services (berthing facilities, technical services, etc), as well as a number of restaurants and shops making it a cosmopolitan destination.
The Limassol Marina includes a total of 650 berthing spots (largest number from all Marinas in Cyprus) and from 2013 onwards has been an increasingly popular quality destination for recreational yachting. In addition, and considering the entire marina which includes many shops, restaurants, bars and luxury properties, its bustling activity, and employment of hundreds have made it an economically favorable establishment.
The Limassol Marina is able to facilitate up to 9,000 people visiting the premises per week, with an area exclusively for yachting at just over 40,000m^2 (including 650 berths for yachts up to 110m). The entirety of the premises is substantially larger and includes 162 luxury apartments and 74 exclusive villas (with private berths or direct access to the beach), and many commercial shops and services ranging from dining, and shopping, to fitness.
Based on the quantitative part of the Blue Limassol Environmental Risk Assessment in 2021, the majority (94,1%) of yacht owners do not keep records of their vessel’s fuel consumption, but the vast majority (71.4%) is willing to undertake actions that would make recreational yachting more environmentally sustainable.
.
The proposed action includes all the necessary steps for transforming the Limassol Marina to a carbon neutral enterprise with the following resulting positive impacts:

1. Reduce GHG emissions from various activities within the Limassol Marina to transform it to a carbon neutral infrastructure
2. Set an example for other blue infrastructures in the country and beyond
3. Set-up renewable energy sources to cover energy needs of the Marina
4. Augment sense of ownership among co-owners and citizen engagement in the matters of green energy production via the creation of an energy community
5. Ensure a sustainable, smart and eco-friendly future for the rapidly advancing nautical tourism sector

3. Mitigation of Risks to the Coastal Area through Technology Tools & Integrated Data Management (CA_3: MERA)

The City of Limassol and its wider surroundings, stretch along a 30 km coastline, one of the largest in the world. Over hundreds of years, the coast and the sea provided the backbone of the citizens’ environmental and socio-economic wellbeing. Today, the bay of Limassol faces unprecedented pressures from anthropogenic activities heavily concentrated on its shores. In total, 6 industrial sectors (Power Generation, Commercial Port Operations, Marinas and Yachting, Fisheries and Aquaculture, Coastal Construction and Sewage and Litter) comprise a complex system of interactive threats to coastal and sea pollution. Carbon neutrality for the City of Limassol is directly linked to the quality of its coastal waters, as the sea is simultaneously the main provider of oxygen and the largest absorber of carbon dioxide emissions (carbon sink) and excess heat generated. Polluting incidences and their sources should, therefore, be quickly identified and evaluated to establish causes and define mitigating practices around them.

At the moment, this task is compromised by two major factors, namely excessive fragmentation of oversight among several local and governmental institutions (which prevents data sharing resulting in inefficiency, reduced accountability and lack of transparency) and insufficient use of technology. Limassol finds itself at a precarious position, given the increasing pressures and in view of newly emerged threats, such as the exploration of natural gas at its shores and the extent of the problem is assessed in a large-scale risk assessment study (Blue Limassol Environmental Risk Assessment, 2021: https://www.limassol.org.cy/en/blue-limassol-forum-2022-research). This study concluded that: a) incidents of marine pollution have increased over the last 5 years, b) the overwhelming number of polluting incidents across Cyprus take place in Limassol, c) only a small fraction of reported incidents is investigated and penalized, and d) the regulatory and monitoring process of Limassol coastal area is highly fragmented among different governmental and municipal bodies.

This project aims to providing a holistic framework of surveillance and risk assessment, in order to reduce, over time, the incidents of environmental pollution. Central to our idea, is the consolidation of available data from the fragmented current system of data collection centers and add real-time primary data from state-of-the art surveillance (drones, unmanned sea vehicles, stationary underwater sensors). When the data has been collected and consolidated to an online platform, the project will proceed with analysis and visualization to extract risk assessment metrics, impact KPI’s and designing an early warning system, should certain thresholds of measurable variables be exceeded.

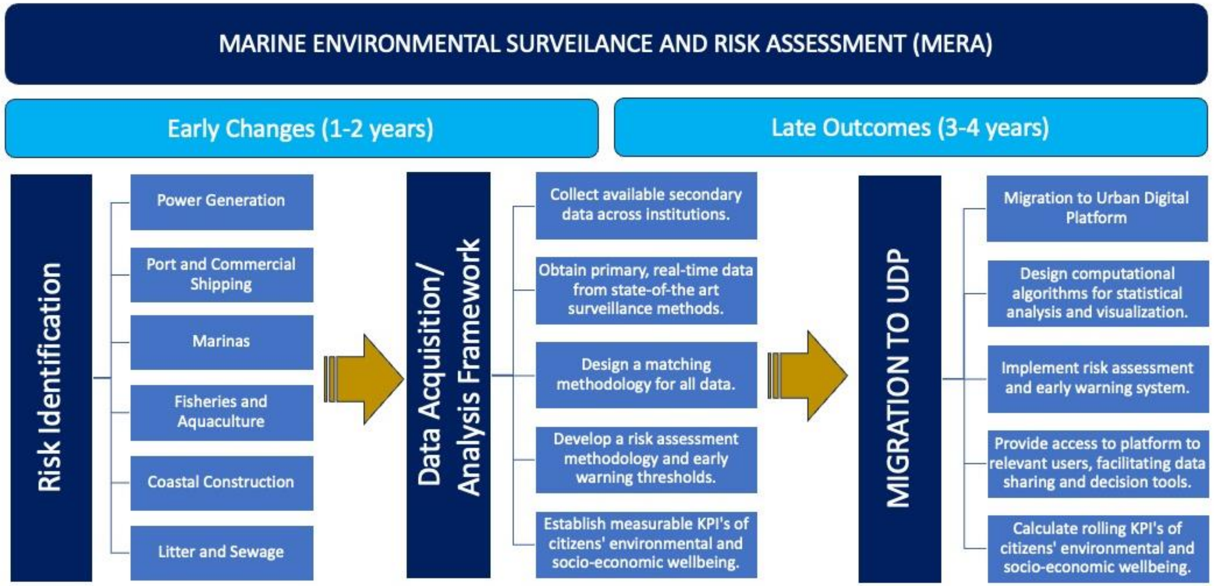


Figure 26. Pathways to Deliverables of the CA_3: MERA action

4. Resilient Coastal Neighbourhoods (RECONE) CA_4:RECONE

RECONE, aims at emissions reduction through enhancing the sense of community and their responsiveness toward environmental issues, which are eroded fast by a rapid-changing economy of Limassol during the last two decades. The project will define and selectively measure, energy consumption/emission patterns and define resilience levels in terms of environmental, social, and economic challenges. The methodology will draw from well documented concepts such as the '15 minutes city' or the 'healthy neighbourhood', tailored to the very different cultural and climatic context of the eastern Mediterranean and Limassol specifically. Furthermore, RECONE will adjust the '15 minutes city' model to the specificities of a coastal neighbourhood and take advantage of the asset of the proximity to the seafront and the beach, a high value public amenity.

Figure 27. RECONE Impact pathway

15 Minute City Indicators

https://www.bostonindicators.org/-/media/indicators/boston-indicators-reports/report-files/15-minute-neighborhoods.pdf

Central to approach will be to decarbonize the area, as well as to include both public and private parties, current initiatives and mechanisms to this effort. The project will focus on one of the seven costal neighbourhoods of Limassol to pilot the mapping of environmental character and impact and will deploy change management mechanisms, local economic regeneration interventions and catalyst environmental change projects all informed by inclusive participatory practices.

Urban regeneration programmes are inherently complex and multi-faceted - small or large with short- or long-term impact contributes toward a more effective use of space, key to addressing climate change. Types of actions interrelate in order to maximise the value of better management of emissions and longer-term sustainability of place - actions relating to changes of habits and attitudes need to be supported by enhancement of the city infrastructure and services as well as the environmental footprint of built space.

At present many of the actions proposed will contribute to the overall healthy neighbourhood and enable behavioural changes, individual preferences, consumption habits, lifestyles, which in parallel to the improvements of associated infrastructure will bring the city closer to the requirements of the European Green Deal and the New European Bauhaus initiative. Early Pilot projects aim at identifying which of aspects of neighbourhood lifestyle can be more effectively impacted through the introduction of technologies, attitudinal change, shift in the structure of the amenity base etc.

Cyprus unfortuinately lacks data on a number of aspects of sustainability. Pilot projects will solve part of this problem as models can be generated and measurements for the specific area can be used to extrapolate to city, or even country-wide scale.

At the same, the city design pattern and urban development realities have alienated the urban fabric and even the coastal neighbourhoods from the coast, the seafront and the beach, a valuable amenity that could contribute much more to the quality of daily life. The actions proposed here will simultaneously make substantial changes to systems, attitudes and sense of community for long term healthy societies which can be applied to all neighbourhoods nationwide.

Delivery Timeline

The timeline for the delivery of this initiative is defined to a 6-year plan, but the actions taken will have much longer impact. Mechanisms for built in self-sustainability of actions (such as engagement and training of the local community to instill a sense of ownership and ensure long-term viability) should also be a consideration while designing them. Apreliminary timeline is shown below:

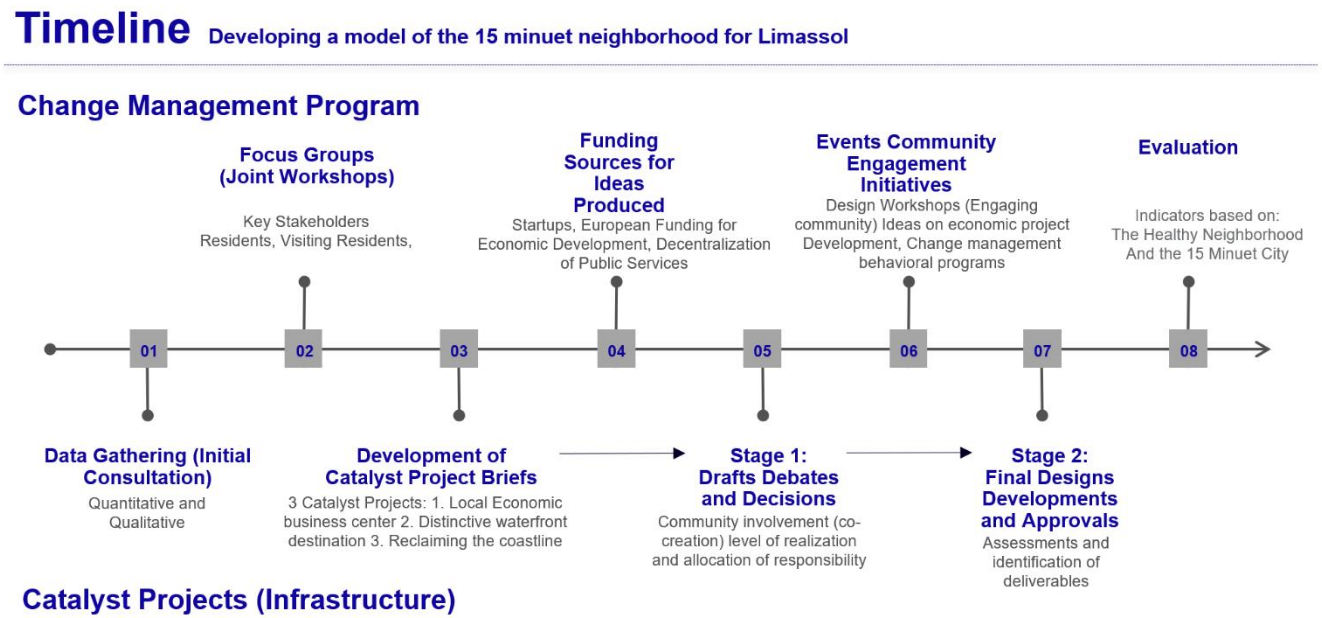


Figure 28. Timeline for RECONE implementation

5. Assessment of Carbon Sinking Potential of Seagrass Meadows in the Limassol Bay (CA_5: Seagrass meadows in Limassol-carbon sinking and meadow restoration)

Seagrasses are key habitat forming species, creating meadows, which are biodiversity hotspots and home to a wide range of marine species. In the Mediterranean, these meadows cover a quarter of the seabed at depths up to 40 m. However, in some areas of the Mediterranean this habitat is being lost at unprecedented rates. In the Levantine basin specifically, seagrass is present in Cyprus but is absent in coastal areas of neighbouring countries such as, Lebanon, Syria, Israel, the south-eastern coasts of Turkey and around the Nile delta in Egypt.
The seagrass species *Posidonia oceanica*, provides a variety of ecosystem services including carbon sequestration ('blue carbon'), water purification, nutrient cycling, habitat formation sustaining hundreds of species and provides support many recreational and economic activities like diving and fishing. *Posidonia*

oceanica meadows are the only "priority" marine habitat in European waters protected by the EU Habitat Directive (92/43/ECC), are used as an indicator for environmental status in the Water Framework Directive and the Marine Strategy Framework Directive, and are protected by the Common Fisheries Policy which prohibits the use of towed gears shallower than 50 m, and by several international conventions such as: the RAMSAR Convention, the Berne Convention and the Barcelona Convention.

Posidonia oceanica, an endemic seagrass in the Mediterranean Sea plays a significant role in carbon sequestration and sinking (blue carbon). *Posidonia oceanica* has the capacity to store vast amounts of carbon in the root system called 'matte' for centuries to millennia, a feature that sets it apart from several terrestrial ecosystems considered to be efficient in carbon storage. *Posidonia oceanica* seagrasses sequester CO_2 at a much faster rate than tropical forests and can store carbon for much longer periods (Pergent-Martini *et al*., 2021). A study using high-resolution seismic reflection imaging estimates that the carbon stock stored in matte is 15.6 ± 2.2 million t C_org (Monnier *et al*., 2021). However, the locked carbon can be slowly released back through decomposition if the seagrass meadow degrades and it is estimated that we lost about a third of the meadows in the last 50 years (Telesca *et al*., 2015).

Quantifying the precise amount of carbon sequestration and sinking by *Posidonia oceanica* can be challenging due to various factors such as regional variability, site-specific conditions, and methodological limitations in measurements. Estimates vary significantly depending on the specific location and condition of the seagrass meadows. Generally, the deeper, the lower the shoot density and the lower the carbon sequestration and fixation rates. It is estimated that the carbon fixation rates can be >1 ton C ha^{-1} and its sink capacity could account for more than >1 million tons of C per year at Mediterranean level (Life Natura Blue Andalucia project).

Studies have estimated that the mean total carbon fixation per year varies between 33.5 and 426.6 g C m^{-2}, and the mean carbon sequestration (long-term sink in the matte), corresponding to the sheath and rhizome tissues, varies between 7.7 and 84.4 g C m^{-2}. A synthesis of measurements made throughout the Mediterranean Sea provided an estimate of the average annual carbon fixation and sequestration rate throughout the Mediterranean basin, with a total fixation rate of 1,302 t C ha^{-1} yr^{-1} and a sequestration rate of 278 t C ha^{-1} yr^{-1}. This annual carbon fixation can reach up to 14.4% of CO_2 emissions for large Mediterranean islands (Pergent-Martini *et al*., 2021).

. Given their great potential for carbon fixation and sequestration, t is crucial that seagrasses across Limassol Bay are assessed further (current status/health, carbon fixation and sequestration rate), monitored, protected, and restored. As an important carbon sink for the city, they should also be considered in the modelling undertaken in the framework of the 100 cities in a next iteration of the Climate City Contract of Limassol .

In Limassol, *P. oceanica* forms a continuous belt parallel to the coastline at approximate depths of 8-25 m. There is evidence that the seagrass is declining since remnants of the root system (matte) is present up to 40-45 m depth and coastal developments and modifications have caused the extinction of this species in shallower waters. This activity aims to assess the sequestered carbon stock in the present meadows, their carbon absorption rates and to initiate a monitoring and restoration programme that will have direct and indirect benefits to the society and the environment.

6. Wave Energy Harnessing for Water Desalination (CA_6: Wave energy production**)**

Action Description

One alternative towards decarbonisation is the exploitation of wave energy. Although not an off-the-shelf solution, the technology and expertise exist but need to be quantitively and otherwise examined.Wave energy, can contribute immensely if a commercial, economically viable, low electricity cost generation Wave Energy Converter (WEC) is deployed. Having 15-20 times more available energy per square metre than wind or solar, five times greater power flow intensity as well as being more persistent than wind power flow, justifies why wave energy has for many decades attracted inventors to harvest it by improvising various devices and mechanisms. It is estimated by the World Energy Council that the exploitable energy potential is at 2 Terra Watts (TW). The global wave power available including open oceans however, is estimated to be of the order of 10 TW, figures well comparable with the world's present power consumption. It was as early as 1799 when the first patent for wave energy conversion system was made by the French Monsieur Girard and his son. Their invention aimed at exploiting mechanical energy directly in order to drive saws, mills pumps and other heavy machinery.

The objectives of this project consider a renewable energy system that harnesses towards Limassol's decarbonisation. Specifically, this conceptual idea focuses on water desalination and has the following specific objectives:

1. Exploit water waves near the coasts in order to
    a. acquire data for the wave potential around Limassol coastal region
    b. develop, based on environmental-impact assessment, projects promoting a renewable and cost-effective water-resource management towards decarbonization.
    c. Carry out the required technical and economic for the optimum WEC penetration, impact and implementation.
    d. Obtain the required licenses from responsible municipal/governmental departments/authorities.
2. Deploy an existing wave energy converter mechanism for off-shore and on-shore use based on integrated optimization of mechanical and hydrodynamic specifications, end-use purpose and environmental impact assessment issues. The WEC may be used for electricity generation and water desalination with countless uses.
3. Design and test pilot specimen in the sea water field and re-assess field optimization-based design for larger scale implementation.

The WEC will be able to handle extreme condition scenarios ranging from incident wave power levels originating from flat-seas to those levels generated from stormy weather conditions, constituting viable and reliable operation. Another advantage of the WEC is the low electricity generation cost that will add to the system's viability.

Certainly, wave energy technologies are still to a lesser or greater extent far from maturity. The potential for improvement of the techno-economical indicators of wave power conversion technologies is very large, while the survivability and the reliability of many devices, particularly for offshore operation, has still to be demonstrated.

Basis of calculations

Almost 50 million cubic metres (m^3) of desalinated water were produced in 2021 in Cyprus **Error! Reference source not found.**. The energy consumed to g enerate 1 m^3 of desalinated water is 3.2 to 4 kWh depending on the desalination unit. The unit in LARNACA for example is capable to produce 58 thousand m^3 of desalinated water per day, 1.74 million m^3 per month, 5.568.000 kWh of consumed energy per month. This accounts to 1.6% of the total energy generated in Cyprus for 2020.

In 2020, the total energy generated by conventional power generation units in Cyprus was 4.246.106 MWh **Error! Reference source not found.** and the total e missions in kg CO_2e were 2.6 billion **Error! Reference source not found.**, **Error! Reference source not found.**.

In 2020 in Cyprus, the emissions for every final electrical kWh consumed was 0.62 kg CO_2e **Error! Reference source not found.Error! Reference source no t found.Error! Reference source not found.Error! Reference source not found.** .

The proposed pilot wave energy converter system (6x100 meters) is capable of generating around 30 m^3 of desalinated water per hour. This corresponds to 2.880 kWh savings per day or 1800 kg CO_2e reduction in carbon emissions **Error! Reference source not found.**.

With regards to Water Supply; Sewerage, Waste Management and Remediation Activities, Limassol consumed 1.390.000 kWh **Error! Reference source not f ound.** or 861.800 kg CO_2e.

The share of Limassol's emissions towards the total of the island is 618.912.000 of kg CO_2e **Error! Reference source not found.**, 23.8%.

Limassol consumes around 18 million m^3 of water per year **Error! Reference source not found.**. Around half these come of water desalination units **Error! Reference source not found.**. This accounts to 36.000 MWh of consumed electrical energy or 22.320.000 kg CO_2e, 3.6% of Limassol's total kg CO_2e emissions. The pilot WEC system for desalination would provide savings in the order of 1.050 MWh or 3% reduction with this amount corresponding to the emissions reduction also **Error! Reference source not found.-Error! Reference source not found.**. The scaled up WEC system for desalination could provide emissions reductions (kg CO_2e) in the order of 6% of Limassol's estimated carbon emissions corresponding to the energy consumed for water desalination. This is around 0.22% of Limassol's total emissions.

4.2 Module B-2 Climate Neutrality Portfolio Design

Module B-2 "Climate Neutrality Portfolio Design" should contain a project description for **each intervention planned**, including interventions by local businesses and industry, according to the template B-2.1, including actions those interventions targeted at enhancing carbon sinks to address residual emissions. Narrative analysis and comments can be provided in B-2.2. A summary of how residual emissions are addressed, should be provided in B-2.3.

B-2.1: Description of action portfolios - textual or visual		
Fields of action	Portfolio description	
	List of actions	Descriptions
Energy systems	1. Reduction of GHG emissions due to change in electricity production mix to 2030 2. Install a large-scale photovoltaics park and establish an energy community 3. Install a 200kWth Fresnel system to provide Industrial process heat 4. Renewables in residential buildings with behind-the-meter storage (with built environment) 5. Install heat pumps at commercial and residential buildings (with built environment) 6. Centralised RES generation and long-term storage to satisfy increased demand from Mission actions.	1. This action is beyond the control of the municipality, but it is significant. Cyprus will undergo a rapid expansion of its PV installed base in the next few years (leading up to 2030) and replace HFO and diesel use in power generation with Natural Gas. This will significantly lower the emissions factor for scope 2 emissions and has cascading effects on all measures that rely on grid electricity. 2. Establish of energy community within the municipality of Limassol by engaging various stakeholders and citizens. The energy community will consist of a large-scale PV park and energy storage technologies, aiming to satisfy the energy demand of end users and make considerable GHG savings. 3. Fresnel systems utilise solar energy and can provide heat at low and mid temperatures. Therefore, they can become an alternative option for supplying clean energy to commercial and industrial facilities. 4. Install photovoltaics at residential buildings in Limassol with behind-the-meter storage systems. This action will turn citizens into prosumers and reduce electricity consumption from the grid significantly. In addition, installation of storage units will further increase energy autonomy. 5. Heat pumps are considered to be the most efficient technology for thermal generation. They can be used to provide heating (including hot water) and cooling

		in buildings. These units can replace boilers or other conventional technologies and reduce carbon emissions significantly. 6. This action proposes the installation of a hybrid RES system that consists of a large PV and wind park, coupled with Long-Term Energy Storage (LDES). The primary goal of this action is to satisfy the increased demand in electricity that arises from actions taken for Lemesos Mission, including elevated demand for EVs and heat pumps.
Built Environment	***Deep building renovation Actions***	
	Increasing the building refurbishment rate through a large-scale retrofitting program	The existing building stock is responsible for a substantial share of GHG emissions. Therefore, it is paramount to stimulate its deep renovation by establishing a large-scale retrofitting programme built on financial instruments designed to support urban rehabilitation and revitalisation. To achieve the NZC target, a yearly renovation rate of 35% is needed.
	Providing NZC guidelines for deep building envelope refurbishment	Simplify design and deployment of deep renovation by providing prescriptive information and certified products identified to be suitable to reduce substantially building energy consumption and improve indoor thermal and visual comfort.
	Making compulsory the installation of effective and movable external shadings	Protecting glazed surfaces from solar radiation is paramount in a cooling-dominate city like Limassol. Therefore, effective and adjustable external shading must be installed to protect all glazed surfaces. Reflective films could be adopted where external shading is not technically mountable. Still, care should be put into assessing the visual hazard caused to neighbour areas like streets, buildings, shops, and squares.
	Banning oil boilers and replace with heat pumps	Ban oil boilers and provide incentives to install new high-efficiency heat pumps and enhance the insulation of heating/cooling piping.
	Upgrading/replacing inefficient electromechanical systems	Legacy equipment in existing buildings is typically low performing. Upgrade/Replace electromechanical systems or subsystems to minimise generation and distribution losses, upgrade the smartness of the control subsystem and enhance heat emission. Installing ceiling fans in enclosed and transitional spaces has to be promoted because they are a cheap and effective solution to expand thermal comfort zone and repel mosquitos and flies.
	Making compulsory the installation of individual energy accounting	According to European Directive 2012/27/UE, make monitoring and accounting systems mandatory in all building units.
	Promoting behavioural change and people's awareness	Promoting behavioural change and awareness by educating building occupants on energy-saving practices with continuous communication and information about the achievement of the project. A specialized app could provide notifications to building users to inform of environmental conditions and alert on energy wasteful conditions

	Promoting building-integrated RES	While Cyprus has a large installed capacity of solar thermal collectors, the integration of PV panels on the building has to be pushed. This action opportunely implemented provides shading to buildings. Several actions are listed and described in the Energy Systems section.
	Promoting building-integrated electricity storage	The objective is to increase the self-consumption of electricity from RES locally generated to reduce the energy withdrawals from the grid. This action provides the reduction of the needed power capacity, room for energy flexibility and contributes to a more robust energy system.
	Integrating EV chargers in residential and office buildings	While implementing deep renovation, installing EV chargers implies limited additional costs if properly designed and executed. But it would contribute to creating a city-wite infrastructure necessary to support the shift from inter-combustion-engine vehicles to electric vehicles.
	Completing installation of smart meters in all units (buildings, dwellings)	Cyprus is guilty of lagging in the installation of smart meters. The City of Limassol must accelerate to complete the full coverage of the installation of smart meters at the soonest. While installing the smart meter, a scalable, modular, interoperable digital platform for data acquisition must be implemented looking to the needs for a future open electricity market ready for local electricity exchange and flexibility bids. A city-wide digital platform is needed also to accommodate the needs for a future open electricity market ready for local electricity exchange and flexibility bids.
		New carbon-neutral buildings Action
	Stating the carbon neutrality target for new buildings	The achievement of carbon neutrality shall be set as a mandatory requirement for new constructions and building renovation with demolition and reconstruction in order to avoid any carbon lock-in mechanism.
	Providing NZC guidelines for carbon-neutral buildings	Simplify design and deployment of new carbon-neutral buildings by providing prescriptive information and certified products identified to be suitable to reduce substantially building energy consumption, improve indoor thermal and visual comfort, and generate considerable renewable energy on site. Promote the re-naturalization interventions, also considering the integration of NBSs in the buildings as carbon sinks.
	Developing and providing a standard calculation tool for the verification of building GHG emissions	The Limassol Municipality, supported by its scientific partners, should develop a standard calculation tool for the verification of the GHG emission of a building to enable professionals and constructors to verify and optimize their projects.
	Promoting the installation of neighbourhood-level RES	Amend building regulation to include a minimal requirement for neighbourhood-level RES installation for large real estate developments (aka multi-building intervention). Several other actions are listed and described in the Energy Systems section.
	Promoting the re-naturalization of the urban area for increasing carbon-sinks	Amend building regulation to include a minimal requirement for the re-naturalization of the urban area by expanding the green areas based on the extension of the new building

		constructions or building renovation with demolition and reconstruction. The needed re-naturalized green area, beyond the already existing one, can be achieved combining (shares that need to be set) permeable ground surfaces, semipermeable greenified surfaces, green roofs, green walls. This measure also contributes to increase urban resilience against flooding
	Urban regeneration	
	Studying city-wide climate-change adaptation strategies	To take advantage of the city's coastal position at the feet of the Troodos mountains, a microclimate study of the city is needed to identify, describe and quantify the natural and anthropogenic phenomena that can be eighter threatening or beneficial to the urban microclimate. Also, it would be helpful to identify areas of the city particularly exposed to reach unbearable environmental conditions resulting in climate hotspots. This study could suggest both city-wide and local adaptation strategies.
	Creating a Breathable City	It refers to introducing the concept of the Breathable city in the urban planning regulation and design practices that aims to: - Design buildings and structures preserving urban corridors to maximise airflow and facilitate the movement of sea breezes; - Preserve urban corridors aligned to prevailing winds; Incorporate building setbacks and courtyards to create open spaces within urban corridors; - Narrowing the width of urban corridors to increase wind speed, - Implement a monitoring and evaluation system to assess the effectiveness of the measures taken via a specialized app or module - Avoid wind blockage.
	Establishing a city-wide monitoring network	Instal a network of weather stations in several spots of the city to monitor environmental parameters affecting citizens' health and quality of life, for example, the thermal environment and air and noise pollution.
	Resurfacing urban horizontal surfaces to increase albedo	The increased albedo of urban surfaces helps to reduce the amount of solar energy trapped in the city, mitigating the urban heat island and reducing the formation of ozone due to a photochemical reaction. - Replacement of the road asphalt with cool asphalt. - Replacement of dark pavements and paved areas of open spaces with light materials. - Ban dark finishing for rooftops and promote cool material, and NSB, like green roofs where possible
	Introducing urban shading systems	During summer months, the utilisation of open spaces is strongly affected by the intense solar radiation coupled with high ambient temperatures. This affects walkability, cycling, and, in general, standing in outdoors.

		Urban shading systems protect citizens from direct solar radiation and can provide additional features like increasing reflection in the sky, generating renewable energy or acting as carbon sinks. Examples are: - Tents, canopies, rollers - PV panel - NBSs like plant covers or trees In some cases, prior to expert assessment, this action can be complemented by installing mists for reducing ambient temperature using evaporative cooling.
	Enhancing green and blue infrastructures in the city	It refers to increasing vegetation and water elements to improve urban biodiversity and ecological balance. - Invigorate green spaces in urban areas, like parks, gardens, streets; map the temperature difference and pollution levels between green areas and built-up areas using digital means - Incorporate water elements like fountains, ponds, channels - Replace impervious surfaces with open soil.
	Co-designing sustainable best practices	Any Action to be effective should be designed to meet the needs of the specified target group it tackles. This requires that the sustainable actions needed to achieve the NZC target are properly validated by citizens and other city stakeholders. In this regard, co-design of sustainable best practices is a must, and it has to involve all components of the local community in the planning and design processes.
	Educational campaigns	These are fundamental to raise awareness about the importance of thermal comfort, pollution reduction, and sustainable practices in open urban space and engage and inform the community about the benefits of adopting environmentally friendly behaviours.
	Creating beautiful and inclusive public spaces	While the NZC target is emissions oriented, the renovation of a city affects a large number of services, functions and activities provided or done in a city. The NZC mission is an unrepeatable opportunity to prepare Limassol to tackle the challenge of the future well beyond its ambitious emission target. Also, to stimulate citizens to a more emission-effective lifestyle, the city must be more beautiful and inclusive by incorporating public amenities, enhancing lighting and safety and integrating public art, following the New European Bauhaus initiative.
	Encourage mixed-use planning	Mixed-use planning aims to encourage mixed-use development to create a diverse range of activities within open urban spaces. Incorporate residential, commercial, cultural, and recreational functions to promote a vibrant and dynamic atmosphere.
	Support flexible and adaptable design of open spaces	Flexible and adaptable design of open spaces can accommodate a variety of uses and activities. Incorporate movable furniture, modular elements, and adaptable layouts to allow for different configurations and events

	Maintenance and up-keep	Regularly maintain and clean open urban spaces to ensure they remain attractive and comfortable. This includes regular pruning and watering of plants, cleaning of water features, and repairing and replacing any damaged infrastructure.
Mobility and Transport	1. Implementation of public transportation strategies 2. Strategies enhancing micro-mobility modal split 3. Development of comprehensive pedestrian network 4. Establishment of vehicle electrification strategies 5. Strategies improving the efficiency of freight transportation 6. Optimization of transportation demand (TDM strategies) 7. Incorporation of smart technologies in sustainable transportation strategies	1. Development of an integrated public transport network (including infrastructure) with multiple modes of transportation, by optimizing the routes to improve efficiency and providing real-time passenger information and ticketing technology, while also establishing multimodal transportation hubs and promoting the implementation of bus prioritization measures. . 2. Prepare an integrated network of bike lanes and paths for all types of cyclists that integrates micro-mobility solutions such as e-scooters and bike-sharing programs into the transportation network, while also expanding bike parking facilities at key locations throughout the city and collaborating with local businesses and organizations to offer incentives for cycling and micro-mobility use, such as discounts or rewards programs 3. Develop and implement a comprehensive pedestrian network with adequate infrastructure and facilities to ensure safe and convenient access throughout the Municipality, while also prioritizing pedestrian-oriented streetscape improvements, pedestrian-friendly paths and establishing pedestrian zones in key commercial and residential areas 4. Advance the electrification of private vehicles by increasing Municipality's preparedness via the construction of charging stations in public spaces, commercial centers, and residential areas and implementing smart charging systems to manage peak energy demands using renewable energy sources, while also integrating charging infrastructure in urban planning and collaborate with private companies to install charging stations in their parking lots or garages, while also including the conversion of bus fleet to electric. 5. Encourage the use of low-emission vehicles for freight transport but mostly consolidating freight shipments to reduce the number of trips and provision of incentives to private companies to switch to sustainable freight transportation, whilst improving the efficiency of last-mile delivery (e.g., using cargo bikes, electric vans) and implementing a smart logistics system to optimize transport routes and reduce emissions at the Municipal level 6. Develop a comprehensive transportation demand management plan that implements traffic management strategies that aim to regulate (or restrict) vehicle-access, by disincentivizing private vehicle use through the introduction of parking management

		schemes, traffic calming measure, while also incentivizing the use of sustainable transportation modes (such as walking, cycling, and shared transportation modes) and developing compact, mixed-use neighborhoods that promote walking and cycling as primary modes of transportation. 7. Implement actions that use smart technologies. For example, Intelligent Transportation Systems (ITS) to monitor traffic and adjust traffic signals, integrate traffic data with public transportation schedules to improve transit connections and uses ITS to optimize freight logistics and reduce emissions. Also, implement Information and Communication Technologies (ICT) by providing online trip planning tools that include public transportation, bike-sharing, car-sharing, and ride-sharing options, cooperative connected and automated mobility (CCAM) services, mobile payment systems for public transportation and parking and provision of on-demand ride-sharing services for commuters and people with disabilities in order to build a holistic cyber-physical system.
Waste & circular economy	**Waste segregation (in house/in bussiness) to remove organic waste for energy and fertilizer production**	The action targets towards the effective implementation of EU waste directives in Lemesos. Currently, a large part of the MSW is landfilled and the high organic load yields high GHG emissions from the landfills (plus additional environmental and public health problems). The target is to separately collect organic waste (e.g., household, restaurants, bakeries) and divert them in existing energy production facilities (e.g., anaerobic digestion and electricity generation). This action will contribute to reducing the emission factor from the landfill, which is among the highest in the EU due to the high organic load. According to our estimations, separate collection of organic waste to produce energy and fertilizer leads to 80% reduction of the GHG emissions related to MSW management in Lemesos. Additional removal of recyclable material could increase the reduction up to 90%. Initials steps could be also conducted for the design of a waste to energy facility in Lemesos, supporting the national targets for waste management and GHG emissions reduction.
	1.1. Quantify waste amounts and streams	During the first year (2024) a detailed survey for monitoring the amount of waste produced in Lemesos and more important the waste streams (e.g., paper, plastic, organic) will be implemented. This is the basis for designing an effective waste management system. The currently available data are considered outdated.
	1.2 Reschedule waste collection and handling system	The waste collection system (infrastructure, machinery, people, collection routes etc) will be examined. The capacity to design a separate collection of the organic fraction will be evaluated. Currently, the municipality mainly collects mixed solid waste from residences and private buildings. Green dot collects separately PMD but the recyclable material collection rate is considered low for the municipality (est. <50%). The facility(-ies) for

		delivering the organic fraction for energy production (anaerobic digestion) will be determined. One possibility exists in Pentakomo (MSW treatment facility) and the other is to contact Anaerobic Digester owners in Cyprus, in proximity to the city of Lemesos.
	1.3. Pilot separate collection of organic waste in selected city areas	During the second year (2025) pilot projects will be launched for separate collection of organic material at the household and private company level. Most of the organic material comes from commercial activity (e.g., bakeries, restaurants, hotels). The organic waste will be also collected from green spaces. The organic fraction will be used for energy and organic fertilizer production.
	1.4. Educate, train citizens in municipal solid waste segregation at the household or business levels	During the first two years (2024-2025) training (co-workshops and “Lemesos Commons”) will be employed to educate/train on aspects related to sustainable waste management. Focus will be on avoiding organic waste and then to separate handling of this resource. Small scale composting of green material and selected food waste (e.g., vegetables) will be demonstrated. This material could be used as soil amendment in micro-forests (see relevant activity – Green infrastructure).
	1.5. Incentives for participating in pilots vs. “pay as you throw”	The citizens involved in the pilots will be benefited from reduced fee on waste collection and handling (payed annually to the municipality). However, the upscaling will involve the application of the “pay as you throw” and “polluters pay” principles. There will be interaction to activity 1.4 for training citizens and professionals and preparing them for the change. Codesign solutions will be also focus (participatory workshops; “Lemesos Commons”)
	1.6. Evaluation and upscaling	The target is to remove organic material (90%) from the municipal solid waste by 2030, to drastically reduce the emissions related to landfills. Half of the MSW annual weight (approx. 25 ktons) is organic material. Removing this, also leads to reduced impacts due to landfill operation. The pilots will be used for upscaling, going from blocks to neighborhoods and the city. The upscaling will be the point where increased financial needs will be required (e.g., personnel, facilities, equipment) to support separate collection of the organic fraction. According to our estimations, separate collection of organic waste to produce energy and fertilizer leads to -80% reduction of the GHG emissions related to MSW management in Lemesos.
	1.7. Monitoring GHG emissions	A monitoring system will be implemented to measure Landfill emissions (current and future), evaluate the anaerobic digester operation efficiency and related emissions, electricity production and its emission factor and the environmental benefits/costs. It will be linked to the city Waste Management system and digital twin. This will support scenario making and impact assessment of interventions towards zero emissions for waste.
	1.8. Waste to energy facility	A feasibility study will be done to assess the potential of creating a waste to energy facility in Lemesos which could contain several components (e.g., anaerobic digester,

		Refuse derived paper and plastics densified Fuel (RPF) etc). The study will include the technical and economic aspects (e.g., investments, capacity). The facility could support circular economy plans at the national level.
	Zero waste production (circular economy) in Lemesos	The action capitalizes the outcomes of Action 1, to go one step further to remove all the recyclable materials in the MSW (e.g., plastic, metals, textile, inert). This will lead to zeroing the amount of waste that goes to the landfills. It will follow a similar approach to action 1 (small projects and upscaling). Beyond this, the potential to establish material reusing and recycling facilities in Lemesos will be examined. As it is, PMD is collected, stored and exported to recycling factories in the EU (which increases GHG emisisons due to shipping transportation).
	2.1. "Pay as your throw – Polluters pay"	"Pay as you throw" and "polluters pay" are two key principles for waste management at the EU scale. To support waste production reduction, these approaches will be implemented. "Pay as you throw" pilots have been implemented in other Cypriot municipalities (e.g., Aglantzia) and lessons learned will be capitalized to run the model in Lemesos. Recent EU guidelines urge for its implementation towards waste reduction. Technically, each household or company waste bin will be related with an ID (e.g., barcode) and the amount of waste delivered weekly will be monitored. The payment for waste collection and treatment will be according to the amount of waste delivered. "Polluters pay" is tailored for the commercial or industrial level. Companies delivering bulk waste or hazardous waste will take over the costs for treatment. Pilot projects will kick off the implementation of these principles in Lemesos and upscaling will follow by 2030.
	2.2. Desing a "circular economy" facility	The implementation of the actions and activities related to sustainable waste management will lead to a detailed inventory of the amounts produced for the various waste streams. Currently, recyclable material collection is low in Lemesos (and Cyprus) in comparison to other EU areas. In addition, recyclable material is not processed in Cyprus but transferred to other countries, where facilities exist. The Mission will start the process of designing a facility for recycling (e.g., plastic, paper). During the first 3 years (2024-2027) feasibility studies will be conducted, policy and funding instruments will be explored. This task contributes to the reduction of Scope 3 emissions (e.g., global transportation) but it is important towards circular economy and green jobs creation in Lemesos and Cyprus.
	2.3. MEL for circular economy in Lemesos	Monitoring waste production, environmental benefits vs impacts, education and learning KPIs. This is essential for the implementation of actions and activities.
	2.4. Networking and expertise transfer (national and international)	Networking with stakeholders (national and international) and experience transfer locally, nationally and internationally (training, story telling) will be implemented regarding the work on sustainable solid waste management.

Coastal and Sea	**1.Cold Ironing Implementation in Limassol Port** **2. Carbon Neutrality in Blue Infrastructure-The case of Limassol Marina** **3. Mitigation of Risks to the COastal Area through Technology Tools & Integrated Data Management** **4. Resilient Coastal Neighbourhoods Assessment of Carbon** **5. Sinking Potential of Seagrass Meadows in the Limassol Bay** **6. Wave Energy Harnessing for Water Desalination**	1. The Cold Ironing initiative at Limassol Port aims at electrical power supply from the shore to ships while they are docked. By replacing onboard diesel engine produced power with a more sustainable energy sources, the initiative seeks to drastically cut emissions, improve air quality, and pave the way for a greener future in maritime operations. The action is guided and aligned with several EU directives and regulations making it somewhat easier to push forward and with significant impact. Direct positive impacts are expected on the health and well-being of the local community, as well as on the overall environmental quality of the region. Furthermore, the project promotes sustainable development and the transition to a low-carbon economy. 2. This action focuses on the Limassol Marina ecosystem to transform it into a "carbon neutral cell" for the city of Limassol. Initiatives such as Renewable Energy Sources investments, electrical charges, building energy management systems etc. will be adopted to decarbonize the area. Synergistic approaches will be implemented to monitor emissions, use state-of-the-art technologies and achieve carbon neutrality, which will deliver social surplus and private benefit. The implementation of an "energy community" model with the involvement of all marina users will also be explored. 3. Focuses on developing and establishing an integrated digitalised surveillance, recording and processing marine pollution system as an integrated and holistic solution for the marine ecosystem, with the aid of technology (e.g., sensors, USV, e-platform), which will provide an early warning system when an environmental risk is identified and will be available to end-users. 4. Focuses on the development of a multi-faceted urban regeneration tool, aiming at emissions reduction through enhancing the sense of community and their responsiveness toward environmental issues, which are eroded fast by a rapid-changing economy of Limassol during the last two decades. The project will define and selectively measure, energy consumption/emission patterns and define resilience levels in terms of environmental, social, and economic challenges. The investigatory methodology will draw from well documented concepts such as the '15 minutes city' or the 'healthy neighbourhood', tailored to the very different cultural and climatic context of the eastern Mediterranean. 5. The assessment of Carbon Sinking Potential of Seagrass Meadows in Limassol Bay action aims at assessing the sequestered carbon stock in the present meadows and to initiate a monitoring and restoration programme that will have direct and indirect benefits

		to the society and the environment. The seagrass species *Posidonia oceanica*, provides a variety of ecosystem services including carbon sequestration ('blue carbon'), water purification, nutrient cycling, habitat formation sustaining hundreds of species and it also supports many recreational and economic activities. The restoration and monitoring programme of one of the most important carbon sinks in Limassol Bay has impacts relevant to environmental assessment, new technologies adoption, policy reforms and social capital. 6. The Wave Energy Harnessing for Water Desalination project aims at reduction of CO2 emissions from conventional desalination systems and serve as a flagship project that can attract global visibility with promotional value for the city of Limassol. The project includes a feasibility study and technological implementation for optimum Wave Energy Converter (WEC) deployment and impact. Also, the deployment of a WEC for off-shore and on-shore use for water desalination, and possibly for electricity generation purposes, as well as the design and test of a pilot in the sea water and field optimisation-based design will pave the way for larger scale implementation. Environmental, economic and social benefits will be achieved, as well promotional value benefits for the mission and the city.

B-2.2.1: Energy Systems_Action 1: Change in electricity production mix (EA_0: Change Electricity Mix)		
Action outline	Action name	Electricity production mix change
	Action type	Infrastructure
	Action description	This action is beyond the control of the municipality, but it is significant. Cyprus will undergo a significant transformation of its electricity generation mix by 2030 as forecasted in the 2023 NECP document (due to be submitted by governmental authorities in the summer of 2023). According to the "With Existing Measures" (WEM) scenario, the mix in 2030 is projected to be as follows: GWh **2023** **2030**

		Gas	-	4,387
		HFO	2,668	-
		Diesel	1,470	-
		Solar PV	468	805
		Solar Thermal	-	-
		Wind	219	236
		Biomass	51	137
		Dist. PV	283	510
		Hydrogen	-	-
		Net Imports	-	29
		Final Demand	4,908	5,754

The WEM scenario **only considers measures that the national authorities have already agreed or pledged to implement** until 2030, and not additional ones aiming to further lower emissions in electricity generation.

The first significant change under WEM is the switch from HFO and Diesel to Natural Gas in electricity generation, projected to start at the end of 2024. This results in a drop in emissions due to the higher energy content of Natural Gas, that mostly consists of CH_4, resulting in smaller amounts of CO2 released to the atmosphere for every until of electricity generated.

The second significant change is the rapid expansion of RES (and especially PV), the installed base of which is forecasted to double in the

		next few years (leading up to 2030). This will significantly lower the emissions factor for scope 2 emissions and has cascading effects on all measures that rely on grid electricity.
Reference to impact pathway	Field of action	Energy
	Systemic lever	Technology/infrastructure; Governance/policy; Financing; Learning and new capabilities
	Outcome (according to module B-1.1)	Early: RES capacity; Regulatory Framework; Prosumer Skills. Later: Market integration, sense of ownership, Digitalisation.
Implementation	Responsible bodies/person for implementation	National authorities
	Action scale & addressed entities	Entirety of municipality (through use of electricity grid and scope 2 emissions reductions)
	Involved stakeholders	National Authorities, electric utilities (e.g., EAC), EPC companies
	Comments on implementation	The implementation would take place **if** the pledges made by national authorities are fulfilled. While these changes are part of the official national energy strategy for 2030 as submitted in the NECP to the EU commission, their implementation is not binding (e.g., the arrival of Natural Gas for electricity production has been touted before but not yet materialised).
Impact & cost	Generated renewable energy (if applicable)	1,688 GWh (on a national scale)
	Removed/substituted energy, volume or fuel type	N/A
	GHG emissions reduction estimate (total) per emission source sector	Emissions in 2018 in Limassol was 396,340 tCO2 based on an emissions factor of 0.874 tCO2/MWh and a consumption of 453 GWh of electricity. Assuming electricity consumption increases in line with national trends for 2030, and emissions based on the 2030 NECP factor (0.285 tCO2/MWh), the reduction is: **226,613 tCO2**

		This is **31.4%** of the emissions of Limassol in 2018
	Total costs and costs by CO2e unit	The total cost for all measures in the electricity sector is projected to be €1.8bn on a national scale, around €217.2m for Limassol based on population share. This results in a specific cost of **958 €/tCO2e**

B-2.2.2: Energy Systems_Action 2: Install a large-scale photovoltaics park and establish an energy community (EA_1: PV Park & Energy Community)		
Action outline	Action name	Energy Community
	Action type	Infrastructure
	Action description	This action will be implemented in the city of Limassol. A Renewable Energy Community will be formed following an initiative from the municipality to engage citizens and demonstrate the advantages of forming, joining, and operating an energy community. This community will follow the **energy cooperative** business model. Technically, the community will incorporate a renewables generation metho coupled with energy storage and smart control of all loads. In this activity a PV park of 1 MW coupled with a 4h battery storage will be established at a dedicated plot of land, which will satisfy the electricity needs of approximately 500 residential units. This action will create the first energy community in Cyprus. Beyond the stationary battery storage, the community will have smart meters at the point of consumption/production of every prosumer and will allow the energy exchange between electric vehicles and residential buildings. Particularly the vehicle-to-house (V2H) concept considers electric vehicles as storage units (batteries), which can offer energy to a building. This will allow for a better integration and utilization of renewables

		within the municipality and will lead to a reduction of electricity requirements from the grid. A detailed business model will be drafted at a later stage, describing all related financial and operational aspects. The business model and the structure of the community needs to be decided by its members in a participatory manner, following the local legislative and regulatory framework. The most common business model for an energy community is the one of an energy cooperative, in which generation technologies belong to the community. In this model the energy community can install a "centralised" photovoltaics park, which will serve the needs of its members.
Reference to impact pathway	Field of action	Energy
	Systemic lever	Technology/infrastructure; Governance/policy; Social innovation; Democracy/participation; Financing; Learning and new capabilities
	Outcome (according to module B-1.1)	Early: RES capacity; Regulatory Framework; Prosumer Skills. Later: Market integration, sense of ownership, Digitalisation.
Implementation	Responsible bodies/person for implementation	Limassol Municipality
	Action scale & addressed entities	Community (typically around 100 buildings, can be smaller or significantly larger)
	Involved stakeholders	• Limassol Municipality • Cyprus Energy Regulatory Authority • Cyprus Distribution System Operator • Citizens' communities
	Comments on implementation	Establishing an energy community is a complex process involving multiple stakeholders. A major challenge is the mobilization of citizens and convincing them to join an energy community and become part of the energy transition. Another critical aspect is the financing of the project, given that setting up an energy community will require access to financing mechanisms.

		Timeline: • 2024: Establishment of a regulatory framework • 2024-2025: Organisation of citizens, preparation of technoeconomic studies and set up an organisational structure and business plan for the energy community. • 2026: Building and operation with 50 members • 2027: Additional 50 members joining the community • 2028: Additional 100 members joining the community • 2029: Additional 150 members joining; reaching the final target value of 500 members. Further, this action can be implemented in different scales, considering a minimum and maximum level: • Minimum size: 500 kW • Minimum cost: M€ 2.3 • Maximum size: 50 MW • Maximum cost: M€ 90.4
Impact & cost	Generated renewable energy (if applicable)	It is estimated that approximately 1,621 MWh/a will be generated from the REC.
	Removed/substituted energy, volume or fuel type	3,241 MWh electricity from the national grid substituted with clean electricity.
	GHG emissions reduction estimate (total) per emission source sector	The park will generate 3,241 MWh which can be subtracted from the energy consumed by the national grid, resulting in **2,833 tCO2** saved, which translates to 0.2% of the city's emissions.
	Total costs and costs by CO2e unit	PV CAPEX 1,079 €/kWp Battery CAPEX 420 €/kWh

		Feasibility studies, permitting, EIAs	100	€/kWp
		Engineering & EPC costs	150	€/kWp
		Grid interconnection	20	€/kWp
		Other infrastructure for community	100	€/kWp
		Land	50	€/kWp
		Total cost	**6,358,000 €**	
		Cost per tCO2	**2,244**	**€/tCO2**

B-2.2.3: Energy Systems_Action 3: Install Fresnel systems to provide Industrial process heat (EA_2: Fresnel System)

Action outline	Action name	Fresnel system
	Action type	Infrastructure
	Action description	Fresnel systems utilise solar thermal energy and can provide heat at low and mid temperatures (in the 140-350ºC range). They can therefore become an alternative option for supplying clean energy to commercial and industrial facilities by augmenting (or even replacing) process heat processes. This action aims to promote the installation of 1MWth of Fresnel systems at industrial facilities to provide thermal energy. The advantage of thermal systems for such uses is the direct heat replacement (in some cases), the modularity and the ability to install them on existing roofs. In addition, the system can provide 2 hours of storage.
Reference to impact pathway	Field of action	Energy
	Systemic lever	Technology/infrastructure; Financing; Learning and new capabilities

	Outcome (according to module B-1.1)	Early: RES capacity; Regulatory Framework; Prosumer Skills. Later: Market integration, Digitalisation, Technology Transfer
Implementation	Responsible bodies/person for implementation	Local SMEs, overseas tech providers, local expert engineers/scientists for initial system design and cost estimation
	Action scale & addressed entities	Industrial facilities, large building with flat roofs (e.g., hospitals, hotels, military barracks, schools etc.)
	Involved stakeholders	Industrial units within the Limassol boundaries, large flat roof owners, Limassol municipality, local energy installers, tech providers (from abroad)
	Comments on implementation	Fresnel systems require large areas to be installed. This makes the promotion of the system to interested operators more challenging. Moreover, Fresnel systems provide low and medium heat. Despite these limitations in potential applications in heavy industry, it can be considered suitable for the majority of industrial applications in Cyprus. Timeline: • 2024: Prepare techno-economic studies for the candidate facilities. This is required to make a proper assessment and calculation of the size of the system, and for the cost. • 2025: Reach the specialised companies in the solar thermal field and order the systems. • 2026 – 2027: Installation and operation of the systems. Scalability: • Minimum size: 250 kW • Minimum cost: k€ 862 • Maximum size: 2 MW • Maximum cost: M€ 6.9
Impact & cost	Generated renewable energy (if applicable)	1 system of 1,000 KWth generates approx.. 1,750 MWth of renewable heat per annum, assuming a capacity factor of 20%.

	Removed/substituted energy, volume or fuel type	Fresnel systems are more suitable for direct replacement of heat produced by fossil fuels, while electric loads are better served by Heat Pumps[3]. Here an assumption is made that this heat would be produced by burning diesel.
	GHG emissions reduction estimate (total) per emission source sector	Assuming an emissions factor equal to 0.267 tCO2/MWh for the combustion of diesel, substituting this will result in reductions of **468 tCO2** **This will lead to a reduction of 0.07% of city's emissions.**
	Total costs and costs by CO2e unit	CAPEX 2,500 €/kWth Feasibility studies, permitting, EIAs 100 €/kWth Engineering & EPC costs 250 €/kWth Integration, grid interconnection 600 €/kWth **Total cost 3,450,000 €** **Cost per tCO2 7,375 €/tCO2**

B-2.2.4: Energy Systems_Action 4: Renewables in residential buildings with behind-the-meter storage (with built environment) (EA_3: Residential RE with storage)

Action outline	Action name	Residential Photovoltaics
	Action type	Infrastructure
	Action description	Install photovoltaics at 10,000 residential buildings in Limassol with behind-the-meter storage systems. This action will turn citizens into prosumers and reduce electricity consumption from the grid significantly.

[3] Electricity used in high temp Heat Pumps suitable for industrial deployment depends on their COP (typically in the range between 2.5-4.5), but it is a low-TRL technology for now.

		Installation of residential photovoltaics in Cyprus is eligible under the scheme of net-metering or net-billing. Typically, residential units install 4 kW and are registered in the net-metering scheme. In addition, installation of storage units will further increase versatility of the system and reduction in possible curtailments, as well allow for arbitrage (when allowed).
Reference to impact pathway	Field of action	Energy
	Systemic lever	Technology/infrastructure; Governance/policy; Social innovation; Democracy/participation; Financing; Learning and new capabilities
	Outcome (according to module B-1.1)	Early: RES capacity; Regulatory Framework; Prosumer Skills. Later: Market integration, sense of ownership, Digitalisation.
Implementation	Responsible bodies/person for implementation	Building owners
	Action scale & addressed entities	City of Limassol
	Involved stakeholders	• Limassol Municipality • Cyprus Energy Regulatory Authority • Cyprus Distribution System Operator • Cyprus Transmission System Operator
	Comments on implementation	In order to achieve the target of installing photovoltaics at 10,000 buildings it would assume that for each year between 2024 – 2030 approximately 1,430 buildings in Limassol would install photovoltaics. This has several challenges in multiple levels, such as the availability of private companies to install photovoltaics, availability of materials, availability of the local planning authority to issue permits, availability of the local DSO to issue connection permits, and the ability of the grid and substation infrastructure to absorb the excess electricity when needed. Timeline:

		• 2024 – 2030: Installation of approximately 1,430 systems each year. Scalability: • Minimum size: 4 kW • Minimum cost: € 9,500 • Maximum size: 80 MW • Maximum cost: M€ 198.5
Impact & cost	Generated renewable energy (if applicable)	It is estimated that approximately 64,824 MWh/a will be generated from the REC.
	Removed/substituted energy, volume or fuel type	Approximately 64,824 MWh/a of electricity delivered by the national grid will be substituted with local clean electricity.
	GHG emissions reduction estimate (total) per emission source sector	The units will generate 64,824 MWh/a which can be subtracted from the energy consumed by the national grid and lead to a reduction of **56,656 tCO2** This will result to a reduction of approximately 8.9% of the total city's emissions.
	Total costs and costs by CO2e unit	PV CAPEX 1,079 €/kWp Battery CAPEX 420 €/kWh Feasibility studies, permitting, EIAs 100 €/kWp Engineering & EPC costs 150 €/kWp Grid interconnection 250 €/installation **Total cost 89,260,000 €** **Cost per tCO2 1,575 €/tCO2**

B-2.2.5: Energy Systems_Action 5: Installation of heat pumps at commercial and residential buildings (with built environment) (EA_4: Heat Pumps-residential)		
Action outline	Action name	Heat pumps
	Action type	Infrastructure
	Action description	Heat pumps are considered to be the most efficient technology for thermal generation. They can be used to provide heating (including hot water) and cooling in buildings. These units can replace boilers or other conventional technologies and reduce carbon emissions significantly. Heat pumps can be installed at new buildings or at existing buildings under renovation and replace older technologies. There are several types of heat pumps (e.g. air/air, air/water, water/water), each one having different characteristics and cost. Given the characteristics of Limassol, and the local needs, it is suggested that air/water heat pumps should be installed to directly replace heating systems based on fossil fuels. This action targets the installation of heat pumps at 1,500 buildings, out of which 500 will be commercial buildings all of them (old stock renovated) and 1,000 will be residential units, again all renovated. Data provided to the team show Limassol to posses 41,247 buildings of all types in 2018.
Reference to impact pathway	Field of action	Energy
	Systemic lever	Technology/infrastructure; Governance/policy; Social innovation; Democracy/participation; Financing; Learning and new capabilities
	Outcome (according to module B-1.1)	Early: RES capacity; Regulatory Framework; Prosumer Skills. Later: Market integration, sense of ownership, Digitalisation.
Implementation	Responsible bodies/person for implementation	Owners of buildings
	Action scale & addressed entities	City of Limassol
	Involved stakeholders	• Limassol Municipality • Cyprus Scientific and Technical Chamber • Buildings' owners

		• Local companies of thermal energy
	Comments on implementation	The procurement and installation of this amount of heat pumps would be a major challenge for several reasons, such as availability of materials and availability of technicians. Moreover, heat pumps have a significant high capital cost. <u>Timeline:</u> • 2024 – 2030: Installation of approximately 220 units each year, in addition to what's prescribed by the NECP. <u>Scalability:</u> • Minimum size: 30 kW • Minimum cost: €30k • Maximum size: 58 MW • Maximum cost: €58.6m <u>Barriers</u> The replacement of existing diesel burners with heat pumps in existing buildings is a challenge for blocks of flats who need a collective decision for such significant investments. Also, the availability of skilled technicians to carry out all these projects comes with question marks. There is also a question on the ability of the grid to absorb the extra demand, esp. at times with low RES generation such as evening hours and at winter time.
Impact & cost	Generated renewable energy (if applicable)	Heat pumps do not directly generate renewable energy but are efficient converters of ambient energy to either heating or cooling using electricity. In the scenario examined for this report they are estimated to generate 10,800 MWh of heating and 19,200 MWh of cooling each year. Despite the fact that replacing older stock of inefficient A/C split units in existing buildings will be a realistic method to reduce energy demand, this action focusses on replacement of fossil fuel-fired heating systems only.
	Removed/substituted energy, volume or fuel type	It is estimated that the heating requirement will be lowered by around 25,200 MWh of energy.

	GHG emissions reduction estimate (total) per emission source sector	The action will lead to a net reduction of 8,121 tCO2, which translates to 1.28% of the total city's emissions
	Total costs and costs by CO2e unit	Case (1) Residential heat pumps: average size = 10 kW SCOP = 4.75 Case (2) Commercial heat pumps Average size = 20 kW SCOP = 4.75 Total capacity = 20MW **Costing** HEAT PUMPS CAPEX 900 €/kWp Feasibility studies, permitting, EIAs 10 €/kWp Engineering & EPC costs 100 €/kWp **Total cost** **20,200,000** **€** **Cost per tCO2** **2,487** **€/tCO2**
Minium and maximum		We consider the minimum realistic installation base to be 1 single system in a residential dwelling and 1 for a commercial building, for a total cost of €30k. The maximum is constrained by the number of existing buildings with an oil-fired/LPG boiler. Exact numbers for this are not easy to obtain, but according to the baseline data provided, 109 GWh of heat are provided to buildings within Limassol using fossil fuels. We consider a total of 3,800 buildings to be close to the maximum possible until 2030, resulting in reductions of 23,550 tCO2, or 3.7% of the city's total.

B-2.2.6: Energy Systems_Action 6: Centralised RES generation and long-term storage to satisfy increased demand from Mission actions (EA_5: RES generation and long-term storage)		
Action outline	Action name	Centralised RES generation and long-term storage
	Action type	Infrastructure
	Action description	This action will be implemented in the city of Limassol or in its approximate vicinity. The aim is to build a hybrid PV/Wind energy system with a total joint size of 45 MW that will be combined with energy storage. The size of the proposed system makes its construction within city limits unrealistic, so a suitable area should be found. The proposed system presents a supply curve that matches better with the demand in 2030 from the increased load that it targets, which is estimated as shown below: Demand from new EVs: 27.32 MWh Demand from shared EVs: 9.93 MWh Demand for electric buses: 25.54 MWh Demand from new Heat Pumps: 11.05 MWh **Total**: **73.84** MWh Electrical private cars have a demand curve that tends to spike in the morning hours in case owners charge at their workplace, or in the evening hours when the arrive at home (typically in the 18:00 – 21:00 window, and for a duration of about 3 hours). Heat Pump demand also matches a similar pattern, especially in heating mode. The supply from a PV system therefore would not match very well, hence the proposal to couple it with a wind onshore power system that will complement the supply and reduce the need for energy storage. The storage system targeted in this action is a Long-Term Energy Storage solution (LDES, which typically serves loads for over 6h) that will effectively use energy generated during the day and deliver it to the load when needed. It is hence not designed to offer short term support to the grid that batteries would be best to do, but to shift the unused supply within a day for when needed. Several technologies for LDES exist, the prime proposal for this action is a battery that stores excess in a thermal medium (such as a molten salt) and reconverts heat to electricity using a Rankine cycle steam turbine. Such systems already exist in Cyprus at research sites (an example is at PROTEAS, around 20km from Limassol). Other options exist such as flow batteries or compressed air energy storage (CAES).

		Apart from the fact that the physical location of the proposed energy generation and storage will not be within city limits, the electricity it generates and delivers will be supplied to the centralised national grid. It is therefore impossible to count it against the Limassol targets unless there is an explicit agreement between the city and the Transmission System Operator. Such an agreement is unprecedent, but a possible model could be the one of energy communities (see action 2 above), where the whole city becomes and energy community assuming a separate legal status and deals with the rest of the grid as a singular entity. In parallel, actions should be taken to influence the demand side in order to better match the supply wit demand. For example, the municipality might choose to deploy EV chargers along a street that will charge EVs using a very low tariff during time of production form the RES system, a little higher when it's supplied from storage, and very high when taking from the grid. The complexity and need to optimise such a solution, matters of demand-side management, the issue of representing the city and a singular entity, as well as the engineering, siting and connection issues it presents should be the subject of a detailed feasibility study, along the lines of other such actions within the Action Plan (such as the tram).
Reference to impact pathway	Field of action	Energy
	Systemic lever	Technology/infrastructure; Governance/policy; Social innovation; Democracy/participation; Financing; Learning and new capabilities.
	Outcome	<u>Early</u>: RES capacity; Regulatory Framework. <u>Later</u>: Market integration, Digitalisation.
Implementation	Responsible bodies/person for implementation	Limassol Municipality Local EPC International suppliers and EPCs
	Action scale & addressed entities	The whole city
	Involved stakeholders	• Limassol Municipality • Cyprus Energy Regulatory Authority • Cyprus Transmission System Operator • Cyprus Distribution System Operator • Citizens' communities

	Comments on implementation	Implementing such a large-scale (for Limassol standards) project is a complex process involving multiple stakeholders. A critical aspect is the correct optimisation of the system to serve city needs, and effective deployment of demand-side management measures, and the legal representation of the city. Another critical aspect is the financing of the project, given that setting up an energy community will require access to financing mechanisms. Timeline: • 2024: Detailed feasibility and optimisation study • 2025: Preparation and licencing stage. • 2026-2027: EPC work (PV subsystem) • 2028: EPC work (wind and storage subsystem) • 2029: Connection
Impact & cost	Generated renewable energy	It is estimated that approximately 137 GWh/a will be generated from the combined PV, wind and storage subsystems.
	Removed/substituted energy, volume or fuel type	We assume that 80% of generation will be matched with demand, and 20% will be sourced from the grid.
	GHG emissions reduction estimate (total) per emission source sector	The whole system will substitute generation that will save 119,335 tCO2eq., around 19% of the Limassol's total.
	Total costs and costs by CO2e unit	(see table below)

	PV system		**Wind system**		**Storage**	
System power	50	MWp	30	MWp	480	MWh
CAPEX	1,079	€/kWp	1,500	€/kW	94	€/GWh
Feasibility studies, permitting, EIAs	100	€/kWp	100	€/kW		
Engineering & EPC costs	150	€/kWp	250	€/kW		
Grid interconnection	20	€/kWp	30	€/kW		
Land	50	€/kWp	80	€/kW		
Total	**€69.95m**		**€58.8m**		**€45.12**	
Grand Total						**€96.7m**

Additionally, several other technologies were considered but are not presented in detail for various reasons. The Following table presents a summary of those examined or considered as realistic options for Limassol:

Technology	Notes
Community district cooling	What it is: A central system that lowers the temperature of water that is then is directed through pipelines to centrally cool down the buildings connected to it. Reasons not to include it: A recent (2018) study[4] commissioned by the Cyprus ministry of energy to assess the potential for heating and cooling district networks in ten different urban areas in Cyprus found that it made economic sense for only two of those, and only using non-renewable energy sources. These findings were corroborated in the latest NECP strategy document where district cooling was considered a non-viable solution. Other comments: The high upfront cost of either a centralised heat pump system or an absorption chiller is one of the reasons for non-inclusion, but also other barriers such as the roadworks required to lay the pipeline network.
Central Energy Storage system	What it is: A centralised energy storage system at city level would theoretically allow the local RES generation to be stored, stabilised, and returned to the local demand at times of no RES production. Reasons not to include it: Including energy storage under the energy community action proposal covers this usage case at a very large degree. Not possible to ascertain its savings potential without modelling, which is beyond the scope of this study. Other comments: A case can be made that different technology types may be more suitable to a city-wide storage project, other than batteries. Thermal storage is a prime candidate that is charged either by thermal sources (such as a CSP system) or by electricity from renewables, preferably curtailed generation.
Demand response measures across the municipality	What it is: Demand response refers to balancing the demand on power grids by encouraging customers to shift electricity demand to times when electricity is more plentiful or other demand is lower.

[4] Development of a Heating and Cooling Strategy at Local Level (Cyprus) (energy.gov.cy)

	Reasons not to include it: Demand response should essentially incentivise demand to shift to times of more RES generation that would address the curtailment of generation that the country is now facing. Assessing the emissions reduction potential of such measures is very hard without dynamic modelling of the energy system, something beyond the scope of this report. It is kept on the list of future actions in case a more in-depth analysis is required. Other comments: This is an effective measure only in the presence of smart meters in every building and the deployment of smart devices that would automatically adjust demand based on external signals (usually price of electricity). This deployment needs to happen quickly.

B-2.2.7: Built Environment: Action1_Deep Building Renovation (BA_1: Deep building renovation)

Action outline	Action name	**Deep building renovation**
	Action type	• Building codes and standards • Building performance rating and reporting • Retrofit measures addressing existing commercial, residential and/or municipal buildings • Requirements which incentivise net zero carbon, Passivhaus or other ultra-high-efficiency standards for existing buildings • Action to advance net zero carbon municipal buildings • On-site renewable energy generation • Electrical appliance performance ratings • LED luminaire technologies • Smart meters • Smart lighting • Domestic and/or commercial-scale battery storage • Demand-side management billing (inc. time-of-use tariffs/billing)
	Action description	Deep building renovation refers to the comprehensive process of upgrading and refurbishing existing buildings to significantly improve their energy efficiency, sustainability, and overall performance. It involves a thorough assessment of the building's envelope, HVAC systems, insulation, lighting, electric appliances and other components to identify areas for improvement. Deep building renovation aims to reduce energy consumption, lower GHG emissions, enhance indoor comfort and extend the lifespan of existing buildings while aligning them with modern energy and sustainability standards. It contributes to the transition towards a greener and more sustainable built environment. This can be achieved by: **Increasing the building refurbishment rate through a large-scale retrofitting programme** Establishing a large-scale retrofitting programme built on financial instruments. For example:

		• A tax relief consisting of a substantial deduction of the expenses incurred for implementing specific interventions aimed at achieving a very high level of energy efficiency.
		• The subsidised interventions can also include installing photovoltaic systems and infrastructure for recharging electric vehicles in buildings.
		The target is to achieve a renovation rate of at least 3.5%.
		
		The deep building envelope refurbishment shall consider:
		• Laying of high-performance thermal insulation externally on the roof and external walls. Insulation helps in reducing heat transfer through the building envelope, minimising the amount of heat entering the building during hot summer months or leaving the building in winter months. It is recommended a maximum thermal transmittance of:
		  o External walls: ≤ 0.4 W/m^2/K.
		  o Roofs: ≤ 0.3 W/m^2/K.
		  o Ground floor slabs: ≤ 0.5 W/m^2/K.
		• Applying cool roofing materials that have high solar reflectance and thermal emittance. Cool roofs reflect a huge portion of solar radiation, reducing heat transfer to the building and keeping the interior cooler. It is recommended
		  o Solar reflectance: ≥ 65%.
		  o While conventional roofs (with solar reflectance of 5-15%) can be 31-47°C hotter than the ambient temperature on any given day, it is expected that cool roofs will only have a surface temperature of 6-11°C higher that the ambient temperature.
		  o Ban for dark roofs.
		• Replacing low-performing windows with low-emission and high-airtightness double-glazed windows. Promote the installation of smart glasses (spectrally selective, chromogenic and electrochromic glasses), which provide excellent daylight quality and control solar and thermal gains. These windows can reduce heat gain while still allowing natural light into the building. It is recommended that:
		  o Thermal transmittance of window frame + glazing: ≤ 2.25 W/m^2/K.
		  o Set limits for window-to-wall ratio for exposure for building type.
		• Adding adjustable, external shading devices (blinds, shades, or awnings) on fenestration or add reflective film on windows where the external shading is not technically viable. These measures can significantly reduce solar heat gain and improve the energy efficiency of windows. Control of external shading devices could be managed by an **app** to optimize solar gain and daylight levels according to the season and needs
		• Promoting the use of phase-changing materials for amortise the solar and heat gains inside buildings and improve their indoor environmental quality.
		• Promote the use of nature-based solutions like green roof and green walls, which provide energy savings and surface temperature regulation, improved air quality, noise reduction, stormwater management, biodiversity and habitat creation, and enhanced aesthetics, beyond enabling urban agriculture and food production.
		• Foster natural ventilation by incorporating features such as operable windows, indoor vents, cross-ventilation strategies, or stack effect to facilitate the movement of fresh air and dissipate heat during cooler periods.

		3. Upgrade/Replace electromechanical systems:
		• Ban oil boilers and replace low-performance air-conditioning systems with reversible high-performance heat pumps (action that implies a substantial enhancement of air quality in the urban environment), which significantly decrease building energy consumption and decrease peak electricity demand.
		• Replacement of low-performance circulator pumps with high-efficiency variable speed circulators which reduce energy consumption for distribution by up to 80%.
		• Insulate mandatory all external pipes of the distribution of heating and cooling systems.
		• Promote the installation of mechanical ventilation systems with proper filtering with high-efficiency double flow heat recovery unit for reducing dust contamination of indoor spaces and energy efficiency.
		    o Minimum heat recovery efficiency: ≥ 80%.
		• Promote the installation of dehumidificators to reduce excess relative humidity for better thermal comfort and health.
		• Introduce energy management systems to implement intelligent energy management strategies that optimize the operation of HVAC systems, lighting, and other building systems based on occupancy patterns and environmental conditions for saving energy, enhancing comfort conditions and providing a healthy indoor environment. Leveraging IoT devices used for smart-up existing buildings, a specialized app could provide users the capacity to control their thermal environment and save energy while increasing personally perceived thermal comfort and productivity.
		• Deploy smart and intelligent technologies for an effective demand-side management of the buildings. Leveraging IoT devices used for smart-up existing buildings, a specialized app could provide users the capacity to control their thermal environment and save energy while increasing personally perceived thermal comfort and productivity.
		• Install RES systems to provide a share of renewable energy sources in primary energy consumption ≥ 20%.
		• Replace traditional incandescent or fluorescent lighting with energy-efficient alternatives such as LED (Light-Emitting Diode) lighting. LEDs consume significantly less energy, produce less heat, and have longer lifespans.
		• Install on a large-scale smart meter and conduct regular (automatized) energy audits to identify areas of energy loss, inefficiency, or fault. Monitor energy consumption through smart meters and use the data to make informed decisions regarding energy-saving measures. A specialized app for the Municipality and TSO/DSO officers implemented on the city digital twin would provide useful (almost) real-time data on energy uses and aggregated metrics/KPIs to performance evaluation
		• Study the feasibility of the installation of a district cooling network.
		
		4. Promoting behavioural change and awareness by educating building occupants on energy-saving practices, such as:
		• Using natural ventilation when dust concentration is low.
		• Adjusting thermostat settings.
		• Turning off lights when not in use.
		• Using energy-efficient electrical appliances (estimated to reduce energy consumption in the order of 20%).
		    o Not lower that class C (according to the new labelling system in force since 1st March 2021).
		A specialized app could provide notifications to building users to inform of environmental conditions and alert on energy wasteful conditions

Reference to impact pathway	Field of action	The Built Environment
	Systemic lever	• **Technology/Infrastructure**: Technology integration in buildings by simplifying requirements, adopting certified products; Technology integration at the neighbourhood scale for integrating district storage and RES; Energy infrastructure upgrade for allowing energy sharing and establishing an energy flexibility market. • **Governance/Policy**: Update of building code for NZC; Incentive schemes for promoting the achievement of the NZC stricter requirements; Collaborative governance structures to streamline procedures among the different State's levels. • **Social innovation**: Collaborative platforms for awareness promotion and commitment reinforcement; Training programs for conscious use of energy and technical building systems; Equity and inclusion in energy access; Education and awareness campaigns; Community-driven initiatives for reinvesting energy cost saving in socially valuable initiatives; Center of Information. • **Democracy/Participation**: Stakeholders engagement; Green Economy and Innovation Observatory to monitor the implementation of actions, prices and enterprises competitiveness; Multi-stakeholder engagement; Social equity and inclusion. • **Finance/Funding**: Targeted financial mechanisms for covering extra costs; De-risk deep energy renovations trough public intervention or guarantees; Public-private partnerships; Increased financial resources; Innovative funding mechanisms. • **Learning/Capabilities**: Data collection processes; Informative campaigns; Demonstration Projects and Pilots; Continuous monitoring and evaluation; Capacity building and skills enhancement; Future citizens • **Digitalisation**: Establishment of a urban Digital platform; Digitalisation of the building stock; Development of the City digital twin for documentation, energy monitoring and fault diagnostic, water monitoring and fault diagnostic, energy and emission optimization.
	Outcome (according to module B-1.1)	• **Early changes**: Technology integration in buildings by simplifying requirements, adopting certified products; Technology integration at the neighbourhood scale for integrating district storage and RES. Update of building code for NZC; Incentive schemes for promoting the achievement of the NZC stricter requirements. Collaborative platforms for awareness promotion and commitment reinforcement; Training programs for conscious use of energy and technical building systems; Equity and inclusion in energy access. Stakeholders engagement; Green Economy and Innovation Observatory to monitor the implementation of actions, prices and enterprises competitiveness. Targeted financial mechanisms for covering extra costs; De-risk deep energy renovations trough public intervention or guarantees; Public-private partnerships. Data collection processes; Informative campaigns; Demonstration Projects and Pilots. Establishment of a urban Digital platform; Digitalisation of the building stock; • **Later outcomes:** Energy infrastructure upgrade for allowing energy sharing and establishing an energy flexibility market. Collaborative governance structures to streamline procedures among the different State's levels. Education and awareness campaigns; Community-driven initiatives for reinvesting energy cost saving in socially valuable initiatives; Center of Information. Multi-stakeholder engagement; Social equity and inclusion. Increased financial resources; Innovative funding mechanisms. Continuous monitoring and evaluation; Capacity building and skills enhancement; Future citizens.

		Development of the City digital twin for documentation, energy monitoring and fault diagnostic, water monitoring and fault diagnostic, energy and emission optimization.
Implementation	Responsible bodies/person for implementation	• Limassol Municipality for the municipal buildings and implementation, monitoring and evaluation of the action. • Government for the renovation of governmental buildings. • Private building owners.
	Action scale & addressed entities	This action will first be enforced within the **30 km/h zone** (see figure in section B1.2), **carenaggio district (Καρνάγιο– the old boat repair yard)** (see figure in section B1.2), and the public (municipal and governmental) buildings located in the municipal extension. Meanwhile, regulations, strategies assess output, financial tools will be developed, tested and refined prior the full-scale implementation. The 30 km/h zone has a good representativity of the entire city. It has an extension of 1.5 km^2 and includes many buildings to refurbish of different type such as, public and privately owned, commercial and non-residential buildings, as well as residential buildings. The carenaggio district has a good representativity of the entire city. It has an extension of 0.72 km^2 and includes buildings to refurbish of different type such as industrial, as well as residential buildings After the implementation, monitoring, evaluation and learning processes, this action is expanded to the whole municipality.
	Involved stakeholders	• Public Works Department • Energy Service Unit/Ministry of Energy • Technical Chamber of Cyprus (ETEK) • The Cyprus Architects Association • Ministry of Energy • Land Department of Cyprus • Cyprus Land Development Corporation • Citizens/Private owners of buildings • Entrepreneurs/Traders • Contractors/builders • Providers of building components such as fenestration, shading devices, insulation, cool materials, electromechanical systems, sensors, PVs etc.
	Comments on implementation	Initially the required mechanisms must be established, identifying the obstacles and setting a timeline. A strategic plan and methodology for the action will be developed and publicised. Also necessary is the auditing and monitoring of current conditions and yearly rates of implementation. Designing integrated policy measures, setting feasible targets and amending building regulation are critical steps. Raising public interest, increasing awareness and citizens involvement and liaising with the Limassol Municipality, the relevant governmental bodies and the involved stakeholders and actors are all imperative. The deep refurbishment of buildings will commence with the renovation of public buildings (universities, schools, hospitals, governmental buildings, municipal and governmental buildings), a sector which requires simpler procedures. The refurbishment of residential buildings and non-residential buildings (commercial, retail, hotels, private hospitals, private schools), will follow since new types of governmental policies of financial tools are are needed. Incentives and taxation relaxation schemes for the private owners/companies shall be developed.

Impact & cost	Generated renewable energy (if applicable)	38,520 MWh/yr @ 2030
	Removed/substituted energy, volume or fuel type	89,125 MWh/yr @ 2030
	GHG emissions reduction estimate (total) per emission source sector	200,386 tonCO_2-eq/yr @ 2030
	Total costs and costs by CO2e unit	Extra capital cost (with respect to minimum legislative requirement): 348.4 M€ Savings due to energy efficiency measures (2024-2030): 9.4 M€/yr @ 2030 Abatement cost: 1,691.62 €/tonCO_2-eq @ 2030

B-2.2.8: Built Environment: Action 2_New carbon-neutral Buildings (BA2_New carbon-neutral buildings)		
Action outline	Action name	**New carbon-neutral buildings**
	Action type	• Building codes and standards • Building performance rating and reporting • Energy efficiency measures addressing existing commercial, residential and/or municipal buildings • Requirements which incentivise net zero carbon, Passivhaus or other ultra-high-efficiency standards for new buildings • Requirements which incentivise net zero carbon, Passivhaus or other ultra-high-efficiency standards for existing buildings • Action to advance net zero carbon municipal buildings • On-site renewable energy generation • Electrical appliance performance ratings • LED luminaire technologies • Smart meters • Smart lighting • Domestic and/or commercial-scale battery storage • Demand-side management billing (inc. time-of-use tariffs/billing)
	Action description	This action involves designing and constructing new buildings with a net-zero carbon footprint over their operation. These buildings are built with a strong focus on energy efficiency, utilising sustainable materials, and integrating renewable energy systems. Carbon-neutral buildings aim to minimise or offset the carbon emissions associated with their operation, resulting in a neutral or even positive impact on the environment mitigating climate change, reducing energy consumption, and showcasing sustainable building practices for a greener and more sustainable future. It is important to avoid any crucial carbon lock-in mechanism. This can be achieved by:

Adopting ultra-high-efficiency standards for constructing new buildings, like the voluntary Passivhaus certification scheme. This requires:

- Laying of high-performance thermal insulation externally on the roof and external walls. It is recommended a maximum thermal transmittance of:
    - External walls: ≤ 0.2 $W/m^2/K$ (current nZEB requirement ≤ 0.4 $W/m^2/K$).
    - Roofs: ≤ 0.15 $W/m^2/K$ (current nZEB requirement ≤ 0.4 $W/m^2/K$).
    - Ground floor slabs: 0.5 $W/m^2/K$ (current nZEB requirement not specified).
- Applying cool roofing materials that have high solar reflectance and thermal emittance. It is recommended
    - Solar reflectance: ≥ 65%.
    - While conventional roofs (with solar reflectance of 5-15%) can be 31-47°C hotter than the ambient temperature on any given day, it is expected that cool roofs will only have a surface temperature of 6-11°C higher that the ambient temperature.
- Installing low-emission and high-airtightness double- or triple-glazed windows. Promote the installation of smart glasses (spectrally selective, chromogenic and electrochromic glasses). It is recommended that:
    - Thermal transmittance of window frame: ≤ 1.5 $W/m^2/K$.
    - Thermal transmittance of glazing: ≤ 1.0 $W/m^2/K$.
    - Set limits for window-to-wall ratio for exposure for building type.
- Adding adjustable, external shading devices (blinds, shades, or awnings) on fenestration or adding reflective film on windows where the external shading is not technically viable. Control of external shading devices could be managed by an app to optimize solar gain and daylight levels according to the season and needs
- Promoting the use of phase-changing materials to amortise the solar and heat gains inside buildings and improve their indoor environmental quality.
- Promote the use of nature-based solutions, like green roof and green walls, which provide energy savings and surface temperature regulation, improved air quality, noise reduction, stormwater management, biodiversity and habitat creation, and enhanced aesthetics, beyond enabling urban agriculture and food production.
- Foster natural ventilation by incorporating features such as operable windows, indoor vents, cross-ventilation strategies, or stack effect to facilitate the movement of fresh air and dissipate heat during cooler periods.

Adopting high performance electromechanical systems

- Install mechanical ventilation systems with proper filtering with high-efficiency double flow heat recovery unit for reducing dust contamination of indoor spaces and energy efficiency.
    - Minimum heat recovery efficiency: ≥ 80%.
- Install RES systems to provide a yearly net zero energy balance.
- Install high-performance reversible heat pumps with meeting the targets of Tier II of ECODESIGN framework Directive (2009/125/EC).
- Insulate mandatory all external pipes of the distribution of heating and cooling systems.
- Install high-efficiency variable speed circulators which reduce energy consumption by up to 80%.

		• Promote the installation of dehumidificators to reduce excess relative humidity for better thermal comfort and health for large buildings. • Introduce building management systems (BMS) to implement intelligent energy management strategies that optimize the operation of HVAC systems, lighting, and other building systems based on occupancy patterns and environmental conditions for saving energy, enhancing comfort conditions and providing a healthy indoor environment. Leveraging IoT devices used for smart-up existing buildings, a specialized app could provide users the capacity to control their thermal environment and save energy while increasing personally perceived thermal comfort and productivity. • Deploy smart and intelligent technologies for an effective demand-side-management of the building. • Set rules for the smart monitoring and metering of the building enabled to conduct regular (automatized) energy audits to identify areas of energy loss, inefficiency, or fault. Use the smart meters' data to make informed decisions regarding energy-saving measures. A specialized app for the Municipality and TSO/DSO officers implemented on the city digital twin would provide useful (almost) real-time data on energy uses and aggregated metrics/KPIs to performance evaluation • Using energy-efficient electrical appliances in Class A, according to the new labelling system in force since 1st March 2021. • Allow the installation of only LED (Light-Emitting Diode) lighting. LEDs consume significantly less energy, produce less heat, and have longer lifespans. • Promote the installation of energy storage. **Promote proper operation of buildings by complying with Building performance rating and reporting such as LEED and BREAM. Starting from for municipal and governmental buildings.** **Promoting behavioural change and awareness by educating building occupants** on energy-saving practices, such as: • Using natural ventilation, • Adjusting thermostat settings, • Turning off lights when not in use. • Using energy-efficient appliances and equipment (estimated to reduce energy consumption in the order of 20%). • A specialized app could provide notifications to building users to inform of environmental conditions and alert on energy wasteful conditions
Reference to impact pathway	Field of action	The Built Environment
	Systemic lever	• **Technology/Infrastructure**: Technology uptake; Local electricity storage capacity; Seamless integration of green and blue solutions; Climate resilient energy infrastructure. • **Governance/Policy**: Streamlined permitting and approval processes; Carbon-neutral building certification programs; Financial support and incentive schemes; Integrated urban planning; Collaborative governance structures; Sustainable urban planning. • **Social innovation**: Community-driven initiatives; Center of Information; Urban farming integration; Affordable green housing; Collaborative construction projects; Socially responsible real estate development. • **Democracy/Participation**: Public awareness and engagement; Carbon-neutral building networking; Carbon-neutral building policy advocacy; Neighbourhood planning committee; Community benefits agreements; Participatory budgeting.

		• **Finance/Funding**: Energy performance contracts; Innovative funding and financial mechanisms; Public-private partnerships; Property Assessed Clean Energy (PACE) Financing; Green bonds; Socially responsible crowdfunding platforms for co-housing. • **Learning/Capabilities**: Capacity Building; Carbon-neutral building construction competitions; Demonstration Projects and Pilots; Monitoring and compliance; Capacity building and skills enhancement; Carbon-neutral building Task Force or Committee. • **Digitalisation**: Establish the Digital building logbook; Provide the platform for leveraging the Smart-grid ready buildings; establish the system for Energy flexibility market.
	Outcome (according to module B-1.1)	• **Early changes**: Technology uptake; Local electricity storage capacity. Streamlined permitting and approval processes; Carbon-neutral building certification programs; Financial support and incentive schemes. Community-driven initiatives; Center of Information; Urban farming integration. Public awareness and engagement; Carbon-neutral building networking; Carbon-neutral building policy advocacy. Energy performance contracts, Innovative funding and financial mechanisms; Public-private partnerships. Capacity Building; Carbon-neutral building construction competitions; Demonstration Projects and Pilots. Digital building logbook; Smart-grid ready buildings. • **Later outcomes**: Seamless integration of green and blue solutions; Climate resilient energy infrastructure. Integrated urban planning; Collaborative governance structures; Sustainable urban planning. Affordable green housing; Collaborative construction projects; Socially responsible real estate development. Neighbourhood planning committee; Community benefits agreements; Participatory budgeting. Property Assessed Clean Energy (PACE) Financing; Green bonds; Socially responsible crowdfunding platforms for co-housing. Establish monitoring mechanism and compliance procedures; Capacity building and skills enhancement; Establish a Carbon-neutral building Task Force or Committee. Establish and Energy flexibility market.
Implementation	Responsible bodies/person for implementation	• Limassol Municipality for municipal buildings • Government for governmental buildings • Private building owners
	Action scale & addressed entities	This action will first be enforced on the **carenaggio district (Καρνάγιο– the old boat repair yard)** (see figure in section B1.2) and the new planned public (municipal and governmental) buildings located in the municipal extension. Meanwhile, regulations, strategies assess output, financial tools will be developed, tested and refined prior the full-scale implementation. The carenaggio district has a good representativity of the entire city. It has an extension of 0.72 km^2 and new buildings planned are mainly non-residential (businesses). After the implementation, monitoring, evaluation and learning processes, this action is expanded to the whole municipality.
	Involved stakeholders	• Public Works Department • Energy Service Unit/Ministry of Energy

		• Technical Chamber of Cyprus (ETEK) • The Cyprus Architects Association • Ministry of Energy • Land Department of Cyprus • Cyprus Land Development Corporation • Citizens/Private owners of buildings • Entrepreneurs/Traders • Contractors/builders • Providers of building components such as fenestration, shading devices, insulation, cool materials, electromechanical systems, sensors, PVs etc
	Comments on implementation	Initially the required mechanisms must be established, identifying the obstacles and setting a timeline. A strategic plan and methodology for the action will be developed and publicised. Also necessary is the auditing and monitoring of current conditions and yearly rates of implementation. Designing integrated policy measures, setting feasible targets and amending building regulation are critical steps. Raising public interest, increasing awareness and citizens involvement and liaising with the Limassol Municipality, the relevant governmental bodies and the involved stakeholders and actors are all imperative. A structured and systematic construction of new carbon-neutral buildings requires proper advancement of the real estate market, supply of construction materials and technologies, skilled workforce. Furthermore, dedicated incentives and taxation relaxation schemes for the private owners and companies shall be developed to cover the extra cost for achieving carbon neutrality.
Impact & cost	Generated renewable energy	2.502 MWh/yr @ 2030
	Removed/substituted energy, volume or fuel type	6,731 MWh/yr @ 2030
	GHG emissions reduction estimate (total) per emission source sector	5,938 tonCO_2-eq/yr @ 2030
	Total costs and costs by CO2e unit	Extra capital cost (with respect to minimum legislative requirement): 51.8 M€ Savings due to energy efficiency measures: 1.1 M€/yr @ 2030 Abatement cost: 8,533.90 €/tonCO_2-eq @ 2030

B-2.2.9: Built Environment: Action 3_Urban Regeneration (BA3_Urban regeneration)

Action outline	Action name	**Urban regeneration**
	Action type	• Building codes and standards • On-site renewable energy generation

		• LED luminaire technologies • Smart lighting
	Action description	This action involves the improvement and development of public areas, parks, and recreational spaces within the city. It focuses on creating inviting, accessible, and multifunctional spaces that promote community engagement, well-being, and environmental sustainability. It may involve the addition of amenities such as seating areas, walking paths, playgrounds, sports facilities, and landscaping elements. Enhancing open spaces aims to provide opportunities for social interaction, physical activity, and relaxation, while also fostering a connection with nature. These spaces contribute to the overall liveability of cities, improve air quality, support biodiversity, and enhance the visual appeal of urban areas, creating vibrant and inclusive communities for residents and visitors alike. Within the context of NZC mission, we intend: • Resurfacing urban horizontal surfaces to increase albedo • Introducing urban shading systems • Enhancing green and blue infrastructures • Creating a Breathable City (maintain and promote air permeability) • Educational campaigns • Maintenance and up-keep To properly achieve the NZC target and provide a sustainable development of the city for the years to come, urban planning of the city should encourage mixed-use planning and support flexible and adaptable design of open spaces.
Reference to impact pathway	Field of action	Built Environment
	Systemic lever	• **Technology/Infrastructure**: Infrastructure to monitor Urban heat and pollution Islands. • **Governance/Policy**: Land use protection; Coordinated policy landscape; Collaborative governance structures to streamline procedures among the different State's levels; • Coordinated policy landscape • **Social innovation**: Collaborative platforms for awareness promotion and commitment reinforcement; Education and awareness campaigns; Center of Information. • **Democracy/Participation**: Stakeholders engagement; Participatory city regeneration; Green Economy and Innovation Observatory to monitor the implementation of actions, prices and enterprises competitiveness; Multi-stakeholder engagement. • **Finance/Funding**: Targeted financial mechanisms for covering extra costs; Public-private partnerships; Increased financial resources; Innovative funding mechanisms. • **Learning/Capabilities**: Data collection processes; Informative campaigns; Demonstration Projects and Pilots; Continuous monitoring and evaluation; Future citizens • **Digitalisation**: Establishment of an urban Digital platform; Digitalisation of the building stock; Development of the City digital twin for documentation, energy monitoring and fault diagnostic, water monitoring and fault diagnostic, energy and emission optimization.

	Outcome (according to module B-1.1)	• **Early changes**: Update of building code for NZC; Incentive schemes for promoting the achievement of the NZC stricter requirements. Collaborative platforms for awareness promotion and commitment reinforcement; Training programs for conscious use of energy and technical building systems; Equity and inclusion in energy access. Stakeholders engagement; Green Economy and Innovation Observatory to monitor the implementation of actions, prices and enterprises competitiveness. Targeted financial mechanisms for covering extra costs; De-risk deep energy renovations trough public intervention or guarantees; Public-private partnerships. Data collection processes; Informative campaigns; Demonstration Projects and Pilots. Establishment of a urban Digital platform; Digitalisation of the building stock; • **Later outcomes:** Infrastructure to monitor Urban heat and pollution Islands. Collaborative governance structures to streamline procedures among the different State's levels. Education and awareness campaigns; Community-driven initiatives for reinvesting energy cost saving in socially valuable initiatives; Center of Information. Multi-stakeholder engagement; Social equity and inclusion. Increased financial resources; Innovative funding mechanisms. Continuous monitoring and evaluation; Capacity building and skills enhancement; Future citizens. Development of the City digital twin for documentation, energy monitoring and fault diagnostic, water monitoring and fault diagnostic, energy and emission optimization.
Implementation	Responsible bodies/person for implementation	• Limassol Municipality
	Action scale & addressed entities	Pilot interventions start in 2024 for test and demonstration before large-scale implementation. They will: A) identify green corridors (urban canyons driving perpendicular to the coastline) and increase greening, avoid blockages due to tall buildings, limit traffic density, create open seafront promenades for enhancing breezes from and to the sea. B) the Municipality of Limassol has about 360 green spots from large parks to small pocket parks plus there are a few abandoned open spaces. A green network will be designed to connect those green spots to the green corridors enhancing and expanding the systems of cycle walkable paths. C) regenerate all public parking and establish rules for the renovation of the private parking but for public use in order to (1) plant trees covering at least 50% (assuming full established foliage of the ground surface, (2) at least 40% of the ground surface as to be permeable, and (3) cool asphalt or material with similar solar reflectance (⩾65%) shall be used for the lines. D) Within the pilot areas referred to above, public squares will be regenerated by resurfacing them with cool material, black asphalt will be removed and substituted with cool asphalts. After monitoring, evaluating and learning from the pilot actions refined measure will be extended to the entire municipality.

		The maps of the pilot areas (**30 km/h zone, carenaggio district**) as well as a map of the **green urban network with green corridors** are included in section B1.2 After the implementation, monitoring, evaluation and learning processes, this action is expanded to the whole municipality.
	Involved stakeholders	• Ministry of Interior/Town planning Department • Ministry of Transport, Communications and Public Works/Public Works Departments • Ministry of Energy/Energy Service • Technical Chamber of Cyprus (ETEK) • The Cyprus Architects Association • Transport and Public Works Departments • Citizens/Private owners of parking places • Entrepreneurs/Traders of Shading devices, Cool materials, PVs etc • Private owners of open spaces such as parking spaces
	Comments on implementation	The enhancement of urban open spaces towards sustainability and comfort is complex and it involves varied sub-actions, as well as many different actors. Initially the required mechanisms must be established, identifying obstacles and set timeline. A strategic plan and methodology for the action will be developed and publicised. Raise public interest, increase awareness and citizens involvement. Liaising with the Limassol Municipality, the relevant governmental bodies and the involved stakeholders and actors is imperative. New types of governmental subsidies are mandatory. New investors to support the activities of the action are also necessary. Action plan with incentives and taxation relaxations for the private owners of parking places.
Impact & cost	Generated renewable energy (if applicable)	36,794 MWh/yr @ 2030
	Removed/substituted energy, volume or fuel type	109,561 MWh/yr @ 2030
	GHG emissions reduction estimate (total) per emission source sector	76,225 tonCO_2-eq/yr @ 2030
	Total costs and costs by CO2e unit	Cost: 168 M€ Abatement cost: 2,204.00 €/tonCO_2-eq @ 2030

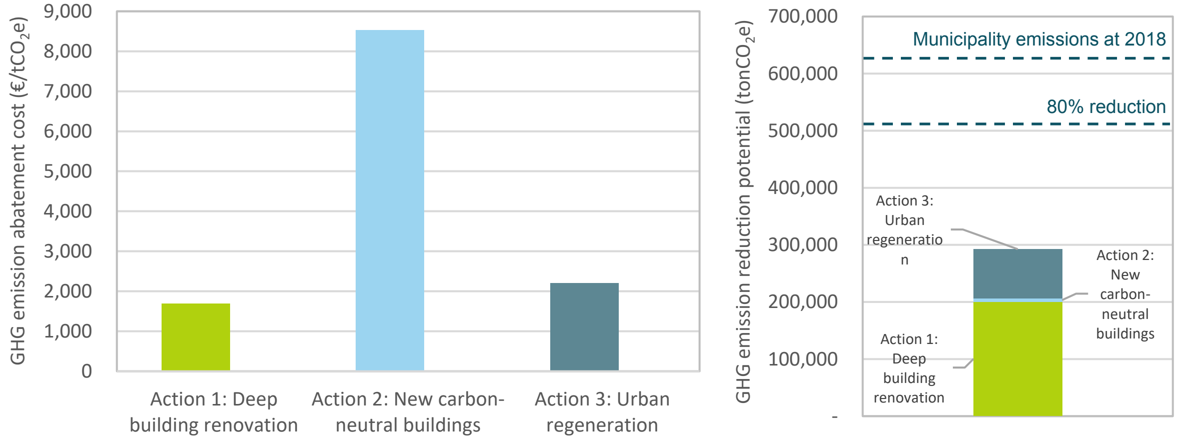


Figure 29. GHG emission abatement cost (left) and GHG emission reduction potential (right)

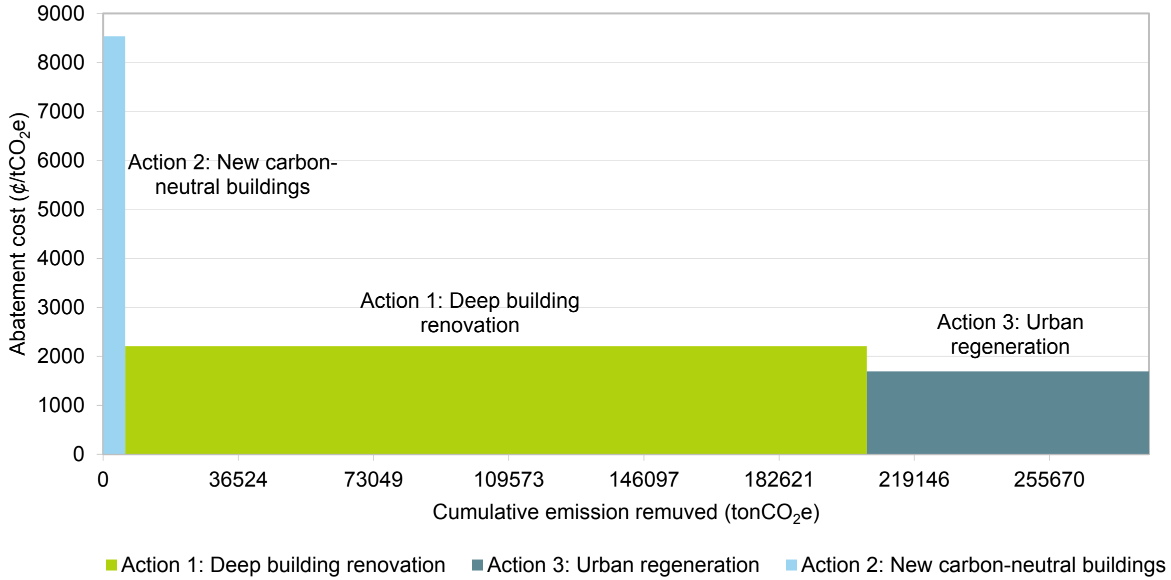


Figure 30. GHG emission abatement curve for the proposed actions

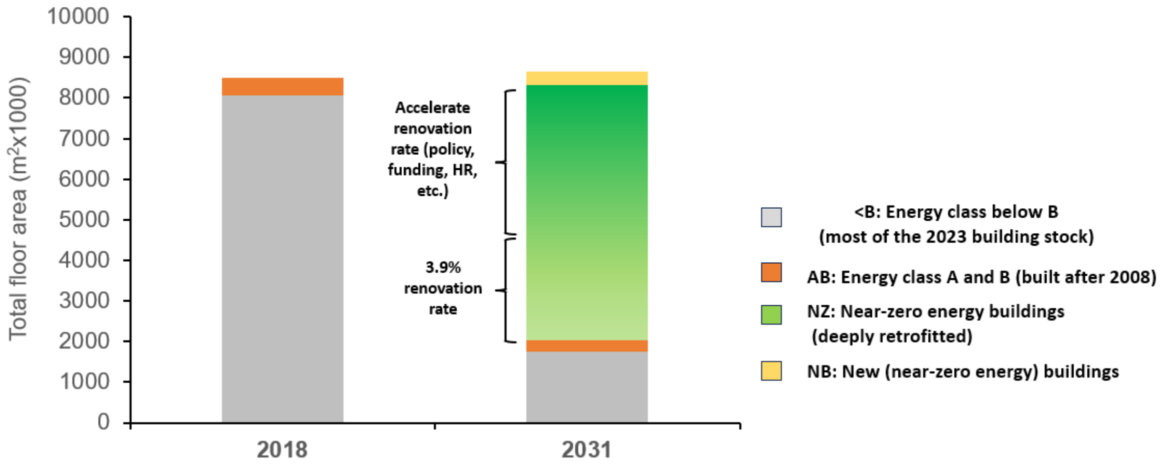


Figure 31. Building stock: towards near zero energy buildings. Total floor areas of different energy classes (baseline and 2031)

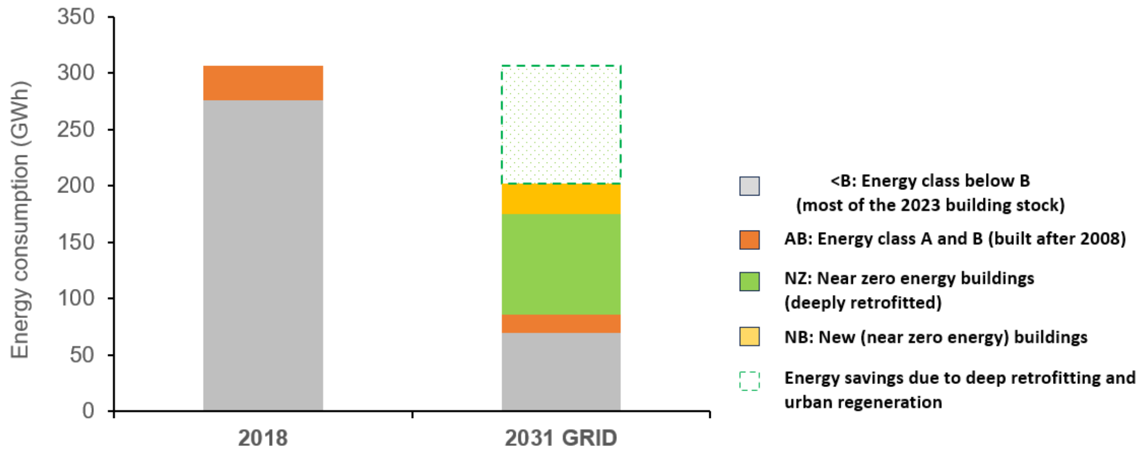


Figure 32. Building non-RES energy consumption (heating, cooling, cooking, appliances)

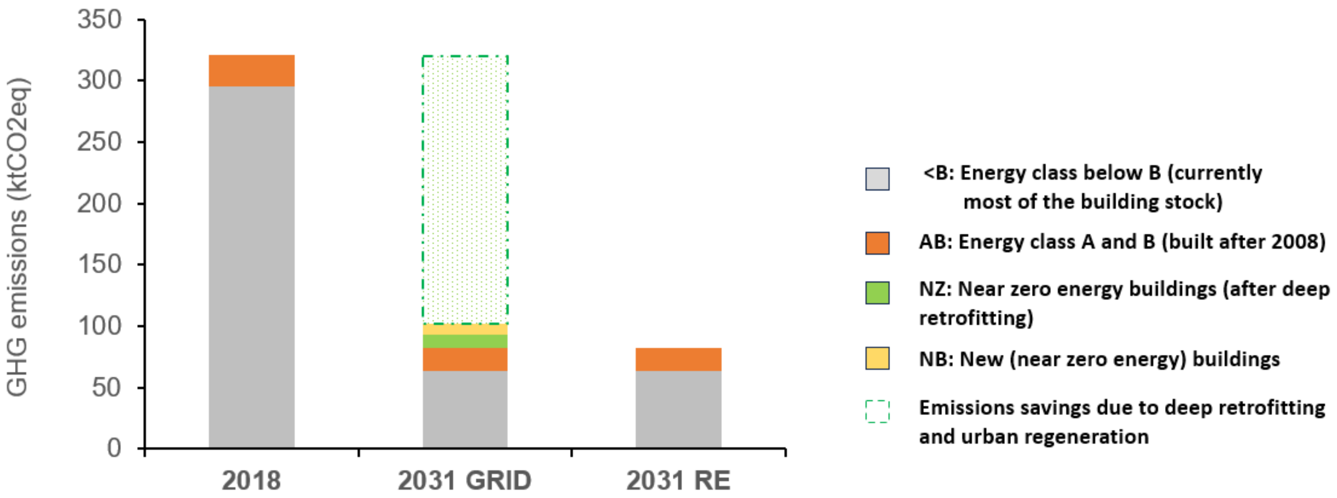


Figure 33. Building total emissions (heating, cooling, cooking, appliances) after deep retrofitting and RE use only

B-2.2.10: Mobility and Transport : Action 1_Implementation of Public Transportation Strategies (TA_1 : Public trannsportation strategies)		
Action outline	Action name	Implementation of Public Transportation Strategies
	Action type	Infrastructure + Technology + Social Innovation
	Action description	This action will be implemented in the city of Limassol. Through this action, a multi-faceted approach is adopted to encourage the use of public transportation as a sustainable and low-emission mobility option. This includes initiatives such as expanding and improving public transportation infrastructure, enhancing the frequency and reliability of services, introducing clean and efficient vehicles, implementing fare incentives, and raising awareness about the environmental benefits of public transportation. By prioritizing and promoting public transportation, this action aims to reduce carbon emissions, alleviate traffic congestion, improve air quality, and create more sustainable and livable cities for all residents.

		This action attempts to boost the modal split of public transportation over 20% by 2030, by improving the public transportation network (operation, accessibility, connectivity), while also including infrastructure upgrading of the bus stops within Limassol Municipality
Reference to impact pathway	Field of action	Mobility & Transportation
	Systemic lever	Technology/infrastructure (upgrade of bus stops, increase public transportation modal split); Governance/policy (implement initiatives derived from Limassol SUMP, ease regulations for mobility providers); Social innovation (Limassol is a leader living lab); Democracy/participation (Open data initiatives making transportation-related data publicly available); Financing (Ensure financial inclusion of implemented solutions); Learning and new capabilities (Knowledge sharing between academia, industry and public agencies; Continuous monitoring and evaluation)
	Outcome (according to module B-1.1) –	Early: upgrade of bus stops; implement initiatives derived from Limassol SUMP; Limassol is a leader living lab; Open data initiatives making transportation-related data publicly available; Knowledge sharing between academia, industry and public agencies Later: increase public transportation modal split; ease regulations for mobility providers; Ensure financial inclusion of implemented solutions; Continuous monitoring and evaluation
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Ministry of Transport Communications and Works; Transport Operators;
	Action scale & addressed entities	Municipality level; District level;
	Involved stakeholders	Limassol Municipality Transit Operators Ministry of Transport Communications and Works Department of Town Planning and Housing Taxi and car-sharing operators Citizen's representatives (NGOs)
	Comments on implementation	The promotion of public transportation strategies is a complicated procedure where an interdisciplinary approach is needed. It requires specific technological and knowledge in the area of public transportation, where these techniques need to be applied in a very specific empirical setting. Also, it requires careful planning, collaboration, and stakeholder engagement
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	Reduction of 10,845tCO_2 by 2030 (6% reduction)

	GHG emissions reduction estimate (total) per emission source sector	Reduction of 10,845tCO2 for the emission source sector of transportation
	Total costs and costs by CO2e unit	The total cost includes the amendment and the price increase of the signed contract by the transport operator of Limassol Municipality to achieve at least 20% modal split of public transportation by 2030 (€19.5m). It also includes the infrastructure upgrading of bus stops (€3.6m). Total Costs: 23.1m EUR (Cost upfront and remaining cost: €2.3m + €20.8m) €2,133 / CO2 eq. ton

B-2.2.11: Mobility and Transport : Action 2_ Enhancing Micro-mobility Modal Split (TA_2: Micromobility modal split)

Action outline	Action name	Strategies Enhancing Micro-mobility Modal Split
	Action type	Infrastructure + Technology + Social Innovation
	Action description	This action will be implemented in the city of Limassol. The action aims to promote micro-mobility strategies as a key component of achieving climate neutrality in cities. It involves implementing a comprehensive set of measures to encourage and support the adoption of sustainable micro-mobility options, such as bicycles, e-bikes, e-scooters, and shared micro-mobility services. These measures include the development of dedicated infrastructure, the expansion of bike-sharing programs, the integration of micro-mobility with existing public transportation networks, and the implementation of supportive policies and incentives. By prioritizing micro-mobility, the action seeks to reduce greenhouse gas emissions, improve air quality, enhance urban livability, and create a sustainable and resilient transportation system for climate-neutral cities. This action aims to increase the modal split of micro-mobility services over 10% by 2030 that include infrastructure cost of creating 36 km of bike lanes (including around 50 street trees per km) and the user cost that incentivizes people to use shared micro-mobility services (subsidizing 11% of trip).
Reference to impact pathway	Field of action	Mobility & Transportation
	Systemic lever	Technology/infrastructure (Construction of a section of cycle lanes; Construction of additional cycle lanes; Provision of street trees; User incentives for bike-sharing use); Governance/policy (Regulatory framework for user incentives; Provide shared e-bikes (metaCAZZE project); Ease regulations for mobility providers such as micro-mobility providers ; Revise Local Plan to enhance bike-lanes and pedestrian networks); Social innovation (Community engagement; Achieve behavioral change and cultural shift towards sustainable transportation (e.g., metaCAZZE project)) Democracy/participation (Pilots for participatory planning (e.g., living lab)); Financing (Provide subsidies to users to use micro-mobility

		services); Learning and new capabilities (Data-driven decision making by evaluating impact of early changes)
	Outcome (according to module B-1.1)	Early: Construction of a section of cycle lanes; Provision of street trees; Regulatory framework for user incentives; Revise Local Plan to enhance bike-lanes and pedestrian networks ; Community engagement; Pilots for participatory planning (e.g., living lab); Provide subsidies to users to use micro-mobility services Later: Construction of additional cycle lanes; User incentives for bike-sharing use; Provide shared e-bikes (metaCAZZE project); Ease regulations for mobility providers such as micro-mobility providers ; Achieve behavioral change and cultural shift towards sustainable transportation (e.g., metaCAZZE project); Data-driven decision making by evaluating impact of early changes.
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Micro-mobility Operators; Ministry of Transport Communications and Works; Citizen's representatives (NGOs)
	Action scale & addressed entities	Municipality level; District level
	Involved stakeholders	Limassol Municipality; Micro-mobility Operators; Ministry of Transport Communications and Works; Citizen's representatives (NGOs)
	Comments on implementation	It is crucial to foster partnerships and engage all relevant parties to ensure a coordinated and cohesive approach. Collaboration enables the sharing of resources, expertise, and responsibilities, leading to effective implementation and long-term sustainability. One of the key challenges in implementing micro-mobility strategies is the need for adequate infrastructure. It is essential to invest in the development of dedicated bike lanes, safe cycling and charging stations for electric micro-mobility vehicles. Regular monitoring and evaluation of the action's implementation are essential to assess its effectiveness and make necessary adjustments. Establishing key performance indicators, collecting data on mode share, emissions reduction, infrastructure usage, and user feedback enables evidence-based decision-making. It is essential to revise local plan and streetscape manual to enhance bike lane network, ease regulations to be able to provide user incentives
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	Reduction of 14,736tCO2 by 2030 (8% reduction)
	GHG emissions reduction estimate (total) per emission source sector	Reduction of 14,736tCO2 for the emission source sector of transportation
	Total costs and costs by CO2e unit	The total cost includes the infrastructure cost of constructing 36km of bike lanes to achieve at least 10% modal split of micro-mobility services by 2030 (€36.7m). It also includes the user cost of incentivizing 11% of total cost for a shared micro-mobility trip (€4.8m).

		Total Costs: 41.54m EUR (Cost upfront and remaining cost: €4.15m + €37.39m) €2,819 / CO2 eq. ton

B-2.2.12: Mobility and Transport : Action 3_ Development of Comprehensive Pedestrian Network (TA_3: Comprehensive Pedestrian Network)

Action outline	Action name	Development of Comprehensive Pedestrian Network
	Action type	Infrastructure + Technology + Social Innovation
	Action description	This action will be implemented in the city of Limassol. The action involves the development of a comprehensive pedestrian network for climate-neutral cities, aimed at creating sustainable and livable urban environments. This initiative focuses on designing and implementing a well-connected network of pedestrian infrastructure, including sidewalks, crosswalks, footpaths, pedestrian-friendly streets, and public spaces. The action also involves improving accessibility, safety, and comfort for pedestrians, encouraging active modes of transportation, and reducing reliance on motorized vehicles. By prioritizing pedestrians, the action seeks to promote sustainable mobility, reduce carbon emissions, enhance public health, and foster vibrant communities. The comprehensive pedestrian network aims to create a future where walking becomes the preferred mode of transportation, contributing to the vision of climate-neutral cities. The action includes the construction of state-of-the-art pedestrianized streets of more than 5km (including shading, street furniture) and the upgrading of signalized junctions into safe pedestrian crossings “PELICAN” as a means to increase the road safety level and perception.
Reference to impact pathway	Field of action	Mobility & Transportation
	Systemic lever	Technology/infrastructure (Provision of street benches and street furniture; Provision of street trees; Upgrade of pedestrian crossings into ‘Pelican’; Construction of state-of-the-art pedestrian lanes) Governance/policy (Implement initiatives derived from Limassol SUMP ; Revise Local Plan to enhance bike-lanes and pedestrian networks ; Revise streetscape manual to provide shading within bike-lanes and pedestrian networks); Social innovation (Community-led initiatives especially for enhancing active transportation modal share); Democracy/participation (Ensure user-centric service improvements; Empower local communities through capacity building initiatives of living lab); Financing (Revenue generation strategies derived from TDM policies that fund sustainable transportation initiatives); Learning and new capabilities (Knowledge sharing between academia, industry and public agencies)
	Outcome (according to module B-1.1)	Early: Provision of street benches and street furniture; Provision of street trees; Upgrade of pedestrian crossings into ‘Pelican’; Implement initiatives derived from Limassol SUMP ; Revise Local Plan to enhance

		bike-lanes and pedestrian networks ; Revise streetscape manual to provide shading within bike-lanes and pedestrian networks ; Ensure user-centric service improvements; Knowledge sharing between academia, industry and public agencies Later: Construction of state-of-the-art pedestrian lanes; Community-led initiatives especially for enhancing active transportation modal share; Empower local communities through capacity building initiatives of living lab; Revenue generation strategies derived from TDM policies that fund sustainable transportation initiatives
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Ministry of Transport Communications and Works; Department of Town Planning and Housing; Citizen's representatives (NGOs)
	Action scale & addressed entities	Municipality level; District level
	Involved stakeholders	Limassol Municipality; Ministry of Transport Communications and Works; Department of Town Planning and Housing; Citizen's representatives (NGOs)
	Comments on implementation	Successful implementation requires an integrated planning approach that involves collaboration among various stakeholders, including urban planners, transportation authorities, city officials, and community representatives. It is essential to consider factors such as land use, transportation infrastructure, urban design, and community needs to ensure the effective integration of the pedestrian network into the existing urban fabric. Implementing a robust monitoring and evaluation framework is essential to assess the effectiveness of the comprehensive pedestrian network. Regular monitoring of key metrics, such as mode share, pedestrian volumes, safety records, and environmental indicators, provides valuable data to measure the impact of the project, identify areas for improvement, and inform future decision-making. There is also the need of revising the Local plan in order to facilitate the efficiency of the comprehensive pedestrian network
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	Reduction of 7,368tCO2 by 2030 (% reduction)
	GHG emissions reduction estimate (total) per emission source sector	Reduction of 7,368tCO2 for the emission source sector of transportation
	Total costs and costs by CO2e unit	The total cost includes the infrastructure cost of constructing over 5km of state-of-the-art pedestrianized streets that include sufficient shading and street furniture (€1.7m). It also includes the upgrading of signalized junctions to safe pedestrian crossings “PELICAN” (€2m).

		Total Costs: 3.7m EUR (Cost upfront and remaining cost: €0.37m + €3.32m) €502 / CO2 eq. ton

B-2.2.13: Mobility and Tranaport: Action 4_ Establishment of Vehicle Electrification Strategies (TA_4: Vehicle Electrification)		
Action outline	Action name	Establishment of Vehicle Electrification Strategies
	Action type	Infrastructure + Technology + Social Innovation
	Action description	This action will be implemented in the city of Limassol. The action aims to promote vehicle electrification strategies for Climate neutral cities. It involves a comprehensive approach to encourage the adoption of electric vehicles (EVs) as a sustainable transportation solution. The action includes initiatives such as providing financial incentives for EV purchases, expanding charging infrastructure networks, and raising awareness about the environmental benefits of electric mobility. Collaboration with automobile manufacturers, local governments, and energy providers is crucial to support the transition to EVs. By promoting vehicle electrification, the action seeks to reduce greenhouse gas emissions, improve air quality, and contribute to the overall goal of creating Climate neutral cities with a sustainable and zero-emission transportation system. The action includes the provision of over 170 charging stations within Limassol Municipality that aim to address the conversion of more than 45% internal-combustion engine vehicles to electric vehicles. Further, it includes the 100% conversion of the bus fleet to electric by 2030.
Reference to impact pathway	Field of action	Mobility & Transportation
	Systemic lever	Technology/infrastructure (Provision of essential charging stations; Provision of the rest of charging stations; Electrification of bus fleet) Governance/policy (Implement initiatives derived from Limassol SUMP ; Integrate transportation planning with land use) ; Social innovation (Achieve social equity that incorporates fairness); Democracy/participation (Open data initiatives making transportation-related data publicly available); Financing (New opportunities for private investors ; Ensure financial inclusion of implemented solutions); Learning and new capabilities (Knowledge sharing between academia, industry and public agencies ; Data-driven decision making by evaluating impact of early changes)
	Outcome (according to module B-1.1)	Early: Provision of essential charging stations; Electrify a portion of buses; Implement initiatives derived from Limassol SUMP ; Integrate transportation planning with land use ; Open data initiatives making transportation-related data publicly available ; New opportunities for private investors ; Knowledge sharing between academia, industry and public agencies

		Later: Provision of the rest of charging stations; Electrification of bus fleet; Achieve social equity that incorporates fairness; Ensure financial inclusion of implemented solutions ; Data-driven decision making by evaluating impact of early changes
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Ministry of Transport Communications and Works; Ministry of Energy, Commerce and Industry; Electrical Utility Operators; Citizen's representatives (NGOs)
	Action scale & addressed entities	Municipality level; District level; National level
	Involved stakeholders	Limassol Municipality; Ministry of Transport Communications and Works; Ministry of Energy, Commerce and Industry; Electrical Utility Operators; Citizen's representatives (NGOs)
	Comments on implementation	One of the key challenges is the development of a robust charging infrastructure network. It requires strategic planning to determine optimal charging locations, considering factors such as accessibility, convenience, and availability of renewable energy sources. Collaboration with energy providers and local authorities is crucial to ensure the timely deployment of charging stations and address any infrastructure gaps. Establishing a robust monitoring and evaluation framework is crucial to assess the progress and impact of the action. Regular tracking of key performance indicators, such as EV adoption rates, emissions reduction, and infrastructure expansion, will help identify areas for improvement and guide future decision-making to ensure the action's effectiveness. There is a need to ease regulations of providing local incentives for investments, while also implementing changes in the grid in the national level
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	Reduction of 92,385tCO_2 by 2030 (51% reduction)
	GHG emissions reduction estimate (total) per emission source sector	Reduction of 92,385tCO_2 for the emission source sector of transportation
	Total costs and costs by CO_2e unit	The total cost includes the construction and provision of over 170 charging stations (€8.55m). It also includes the conversion of the bus fleet to 100% electric by 2030 (€37.26m). Total Costs: 45.81m EUR (Cost upfront and remaining cost: €4.58m + €41.23m) €496 / CO_2 eq. ton

B-2.2.14: Mobility and Transport: Action 5_ Strategies Improving the Efficiency of Freight Transportation (TA_5: Efficient Freight Transportation)

Action outline	Action name	**Strategies Improving the Efficiency of Freight Transportation**
	Action type	Infrastructure + Technology + Social Innovation
	Action description	This action will be implemented in the city of Limassol. The action aims to implement strategies that enhance the efficiency of freight transportation in order to contribute to the goal of achieving climate neutrality in cities. The project focuses on optimizing various aspects of freight operations, including technology, infrastructure, and logistics, to reduce emissions and enhance sustainability. Actions may include adopting advanced technologies such as smart routing and real-time tracking, promoting modal shift to more sustainable transport modes, optimizing freight consolidation and last-mile delivery, and incentivizing the use of low-emission vehicles. Through these efforts, the project seeks to improve the overall efficiency of freight transportation, reduce greenhouse gas emissions, and support the transition towards climate neutral cities. The action includes the construction of 8 transportation centers within Limassol Municipality, while also converting garbage trucks and Municipal fleet to electric
Reference to impact pathway	Field of action	Mobility & Transportation
	Systemic lever	Technology/infrastructure (Construction of transportation centers; Electrification of Municipal fleet); Governance/policy (Integrate transportation planning with land use ; Establish freight-friendly zoning for integrated freight strategies); Social innovation (Achieve social equity that incorporates fairness); Democracy/participation (Open data initiatives making transportation-related data publicly available); Financing (Establish green freight funding programs); Learning and new capabilities (Data-driven decision making by evaluating impact of early changes ; Continuous monitoring and evaluation)
	Outcome (according to module B-1.1)	Early: Construction of transportation centers; Integrate transportation planning with land use ; Open data initiatives making transportation-related data publicly available ; Establish green freight funding programs Later: Electrification of Municipal fleet; Establish freight-friendly zoning for integrated freight strategies ; Achieve social equity that incorporates fairness; Data-driven decision making by evaluating impact of early changes; Continuous monitoring and evaluation
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Freight Operators; Ministry of Transport Communications and Works; Ministry of Commerce, Energy and Industry; Cargo operators; Citizen's representatives (NGOs)
	Action scale & addressed entities	Municipality level; District level
	Involved stakeholders	Limassol Municipality; Freight Operators; Ministry of Transport Communications and Works; Ministry of Commerce, Energy and Industry; Cargo operators; Citizen's representatives (NGOs)

	Comments on implementation	Engage with relevant stakeholders, including freight carriers, logistics providers, manufacturers, and local authorities, to ensure their active involvement and support. Collaborative partnerships can help align interests, share best practices, and address barriers to implementation. Invest in the development of supportive infrastructure, such as dedicated freight lanes, loading zones, and intermodal terminals. Additionally, encourage the adoption of advanced technologies, such as telematics, automation, and data analytics, to optimize freight operations and improve overall efficiency. Regularly monitor and evaluate the implementation of strategies to assess their effectiveness in reducing emissions and achieving climate neutrality goals through KPIs. The action needs to take into consideration that the regulations pertaining to local incentives need to be revised and be more flexible.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	Reduction of 9,439tCO2 by 2030 (5% reduction)
	GHG emissions reduction estimate (total) per emission source sector	Reduction of 9,439tCO2 for the emission source sector of transportation
	Total costs and costs by CO2e unit	The total cost includes the construction of 8 transportation centers that will help on improving the efficiency of freight transportation (€26m). It also includes the conversion of the garbage trucks and municipal fleet to 100% electric by 2030 (€9.45m). Total Costs: 35.45m EUR (Cost upfront and remaining cost: €3.5m + €31.95m) €3,809 / CO2 eq. ton

B-2.2.15: Mobility and Transport: Action 6_Optimization of Transportation Demand (TDM Strategies) (TA_6 : TDM Strategies)

Action outline	Action name	Optimization of Transportation Demand (TDM Strategies)
	Action type	Infrastructure + Technology + Social Innovation
	Action description	This action will be implemented in the city of Limassol. The development of a transportation demand management plan for Climate neutral cities involves implementing a comprehensive strategy to optimize transportation systems and reduce carbon emissions. This action aims to create a sustainable and efficient mobility ecosystem by promoting alternative modes of transportation, encouraging carpooling and ridesharing, improving public transit infrastructure, and implementing smart technology solutions. The plan includes measures such as congestion pricing, parking

		management, and incentives for sustainable travel options. By strategically managing transportation demand, the plan seeks to minimize the use of private vehicles, reduce traffic congestion, and ultimately achieve climate neutrality by significantly lowering greenhouse gas emissions associated with transportation activities. The action includes the construction of 5 park and ride locations, the installation of 5 mobility hubs in strategic locations within Limassol Municipality and the design and operation of a platform that controls TDM strategies.
Reference to impact pathway	Field of action	Mobility & Transportation
	Systemic lever	Technology/infrastructure (Construction of park and ride locations; Construction of mobility hubs); Governance/policy (Integrate transportation planning with land use ; Ease bureaucracy motions to ensure efficiency of TDM measures); Social innovation (Limassol is a leading living lab (metaCAZZE project); Democracy/participation (Ensure user-centric service improvements; Empower local communities through capacity building initiatives of living lab); Financing (Revenue generation strategies derived from TDM policies that fund sustainable transportation initiatives); Learning and new capabilities (Data-driven decision making by evaluating impact of early changes)
	Outcome (according to module B-1.1)	Early: Construction of park and ride locations; Integrate transportation planning with land use ; Limassol is a leading living lab (metaCAZZE project) ; Ensure user-centric service improvements Later: Construction of mobility hubs; Ease bureaucracy motions to ensure efficiency of TDM measures ; Empower local communities through capacity building initiatives of living lab; Revenue generation strategies derived from TDM policies that fund sustainable transportation initiatives; Data-driven decision making by evaluating impact of early changes
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Ministry of Transport Communications and Works; Department of Town Planning and Housing; Citizen's representatives (NGOs)
	Action scale & addressed entities	Municipality level; District level; National level
	Involved stakeholders	Limassol Municipality; Ministry of Transport Communications and Works; Department of Town Planning and Housing; Citizen's representatives (NGOs)
	Comments on implementation	Effective implementation requires supportive governance structures and policies that encourage sustainable transportation practices. Regular monitoring and evaluation are essential to assess the effectiveness of the transportation demand management plan. Metrics such as modal shift, vehicle kilometers traveled, greenhouse gas emissions, and public perception can help track progress, identify challenges, and make necessary adjustments to optimize outcomes. Implementation should be viewed as an iterative process, with ongoing evaluation, feedback mechanisms, and opportunities for improvement. Regular review of the plan's performance and incorporation of new technologies and

		innovative approaches ensure that the transportation demand management strategies remain relevant and effective over time. The action needs to consider legislative changes regarding potential conflicts with existing legislation on the implementation of TDM strategies
	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	Reduction of 8,786tCO_2 by 2030 (5% reduction)
	GHG emissions reduction estimate (total) per emission source sector	Reduction of 8,786tCO_2 for the emission source sector of transportation
	Total costs and costs by CO_2e unit	The total cost includes the construction of 5 park and ride locations (€24.17m) and 5 mobility hubs (€2.33m). It also includes the design and operation of a platform that controls TDM strategies (€0.77m). Total Costs: 27.27m EUR (Cost upfront and remaining cost: €2.72m + €24.54m) €3,132 / CO_2 eq. ton

B-2.2.16: Mobility and Transport: Action 7_Incorporation of Smart Technologies in Sustainable Transportation Strategies (TA_7: Smart Technologies in Sustainable Transportation)

Action outline	Action name	Incorporation of Smart Technologies in Sustainable Transportation Strategies
	Action type	Infrastructure + Technology + Social Innovation
	Action description	This action will be implemented in the city of Limassol. The action aims to integrate and incorporate smart technologies in sustainable transportation strategies for Climate neutral cities. This involves deploying advanced technologies such as intelligent traffic management systems, real-time data collection and analysis, smart charging infrastructure, and connected vehicles. The action focuses on optimizing transportation efficiency, reducing traffic congestion, and promoting the use of low-emission and electric vehicles. It also entails developing smart transportation infrastructure and implementing innovative mobility solutions that enhance user experience, promote multimodal transportation, and enable data-driven decision-making. By leveraging smart technologies, the action aims to create a sustainable, efficient, and environmentally friendly transportation system that supports Climate neutral cities The action includes the smart upgrading of bus stops within Limassol municipality, the signalization of 5 roundabouts to form a corridor of signalized roundabouts for more efficient control of traffic, the smart upgrading of crossings and a cost allocated for ITS equipment.

Reference to impact pathway	Field of action	Mobility & Transportation
	Systemic lever	Technology/infrastructure (Incorporate smart technologies in bus stops; Implement carpooling school-related transportation (metaCAZZE project); Installation and provision of ITS services in the transportation system; Convert crossings to smart crossings; Signalize and synchronize roundabouts) ; Governance/policy (Implement initiatives derived from Limassol SUMP ; Development of robust data governance frameworks and privacy regulations) ; Social innovation (Achieve social equity that incorporates fairness); Democracy/participation (Open data initiatives making transportation-related data publicly available); Financing (New opportunities for private investors; Ensure financial inclusion of implemented solutions) Learning and new capabilities (Knowledge sharing between academia, industry and public agencies ; Data-driven decision making by evaluating impact of early changes)
	Outcome (according to module B-1.1)	Early: Incorporate smart technologies in bus stops; Implement carpooling school-related transportation (metaCAZZE project); Implement initiatives derived from Limassol SUMP ; Open data initiatives making transportation-related data publicly available ; New opportunities for private investors ; Knowledge sharing between academia, industry and public agencies Later: Installation and provision of ITS services in the transportation system; Convert crossings to smart crossings; Signalize and synchronize roundabouts; Development of robust data governance frameworks and privacy regulations ; Achieve social equity that incorporates fairness; Ensure financial inclusion of implemented solutions ; Data-driven decision making by evaluating impact of early changes
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Ministry of Transport Communications and Works; Deputy Ministry of Research, Innovation and Digital Policy; Citizen's representatives (NGOs)
	Action scale & addressed entities	Municipality level; District level; National level
	Involved stakeholders	Limassol Municipality; Ministry of Transport Communications and Works; Deputy Ministry of Research, Innovation and Digital Policy; Citizen's representatives (NGOs)
	Comments on implementation	Successful implementation relies on close collaboration between government bodies, transportation agencies, technology providers, and community representatives. With the implementation of smart technologies, there is a need for robust data management and privacy measures. Regular monitoring and evaluation of the implemented strategies are vital to assess their effectiveness and make necessary adjustments. Collecting data on key performance indicators, such as emissions reductions, mode shifts, and user satisfaction, provides valuable insights for future improvements. The action should be designed with scalability and adaptability in mind. As technologies advance and cities evolve, the implemented solutions should be able to accommodate future growth and changing needs, ensuring long-term sustainability. The action needs to consider challenges pertaining to the contract of the public transportation operator and easing bureacracy purposes regarding cyber security and data privacy issues

Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	Reduction of 8,780tCO2 by 2030 (5% reduction)
	GHG emissions reduction estimate (total) per emission source sector	Reduction of 8,780tCO2 for the emission source sector of transportation
	Total costs and costs by CO2e unit	The total cost includes the smart upgrading of bus stops (€1.6m), the signalization of 5 roundabouts (€9.66m), the smart upgrading of crossings (€1.47m) and a cost allocated for ITS equipment (€5m). Total Costs: 17.73m EUR (Cost upfront and remaining cost: €1.77m + €15.96m) €2,048 / CO2 eq. ton

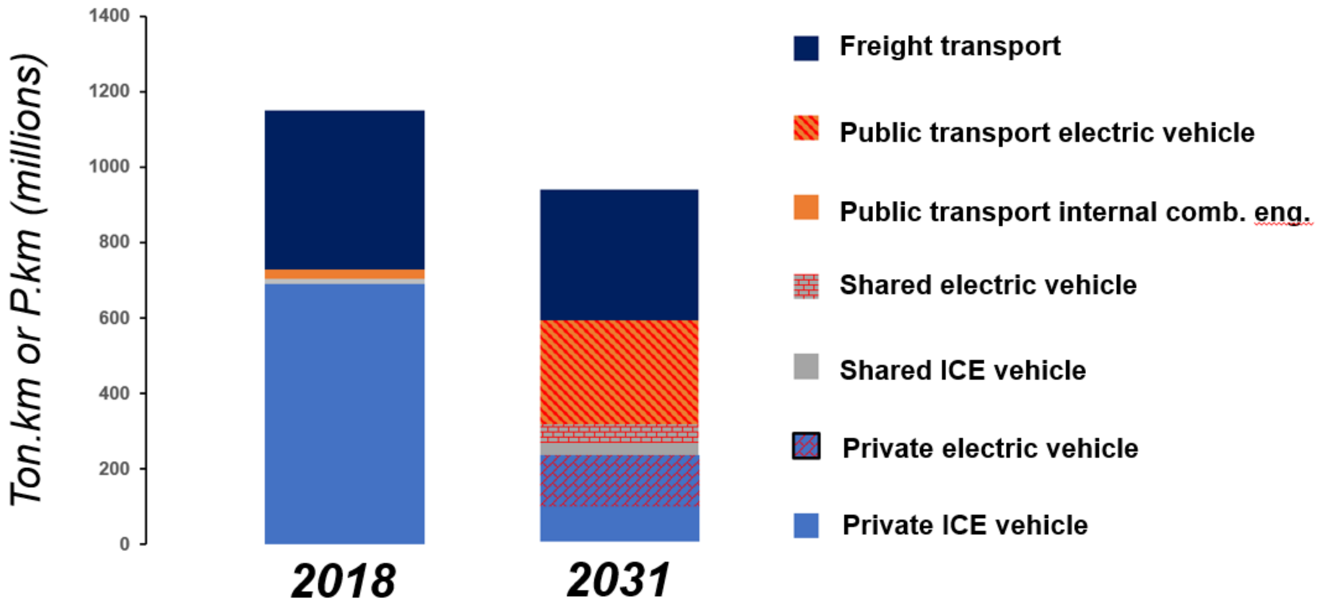


Figure 34. Transportation: traffic volume (reduction) due to actions implemented

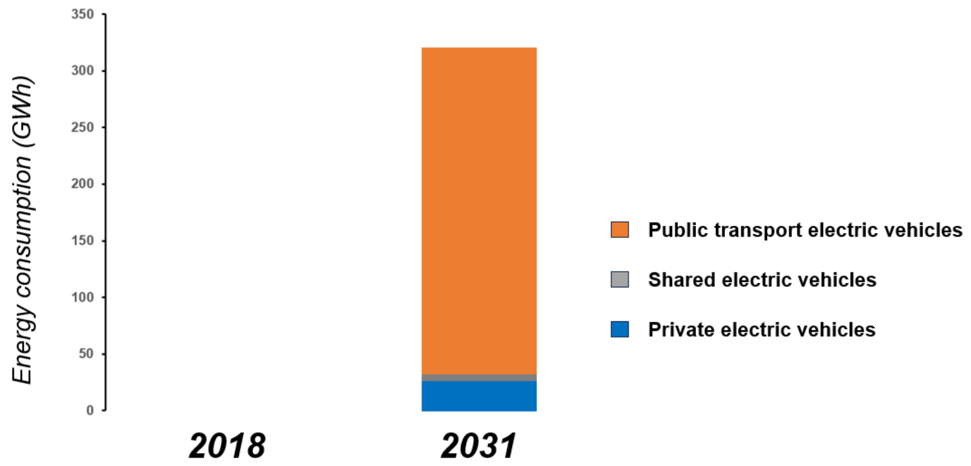


Figure 35. Transportation: electrical energy (scope 2) consumption due to electrification

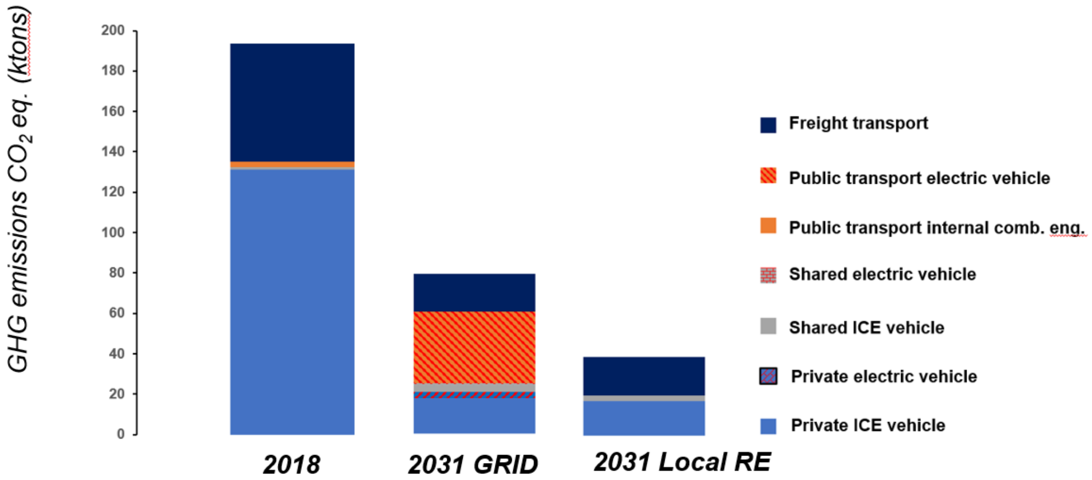


Figure 36. Transportation emissions (baseline; 2031 electricity from the grid and 2031 local RE)

B-2.2.17: Waste Management and Circular Economy : Action 1_ Waste segregation to remove organic waste for energy and fertilizer production (WA_1: Waste (organic) to energy)		
Action outline	Action name	Waste segregation (in house/in bussiness) to remove organic waste for energy and fertilizer production
	Action type	Infrastructure/awareness/education
	Action description	The action targets towards the effective implementation of EU waste directives in Lemesos. Currently, a large part of the MSW is landfilled and the high organic load yields high GHG emissions from the landfills (plus additional environmental and public health problems). The target is to separately collect organic waste (e.g., household, restaurants, bakeries) and divert them in existing energy production facilities (e.g., anaerobic digestion and electricity generation). Limassol and Pentakomo treatment plants use anaerobic digesters to process organic waste, generating biogas for energy production. Diverting more organic waste to these digesters could increase biogas production, reducing environmental impact and contributing to the circular economy. The Limassol municipality could promote home composting among residents by providing education, resources, and possibly subsidized compost bins. This would decrease landfill waste and produce nutrient-rich compost for gardens and local green spaces. Lastly, the municipality could initiate a program for collecting used cooking oil, which can be recycled into biodiesel.This action will contribute to reducing the emission factor from the landfill, which is among the highest in the EU due to the high organic load. According to our estimations, separate collection of organic waste to produce energy and fertilizer leads to 80% reduction of the GHG emissions related to MSW management in Lemesos. Additional removal of recyclable material could increase the reduction up to 90%. Initials steps could be also conducted for the design of a waste to energy facility in Lemesos, supporting the national targets for waste management and GHG emissions reduction.
Reference to impact pathway	Field of action	Waste management
	Systemic lever	**Detailed description on B.1.1.** **Technology/Infrastructure:** The utilization of anaerobic digesters in treatment plants to process organic waste and generate biogas is an example of applying technology for sustainable practices. Similarly, the infrastructure for collecting used cooking oil and transforming it into biodiesel falls into this category. The infrastructure for anaerobic digestion already exist to Pentakomo and Moni Waste Treatment Plants. **Governance/Policy:** The introduction of a program for separate collection of the organic waste (food, green) plus collecting used cooking oil and promoting home composting requires policy changes and oversight from the municipal government. **Social Innovation:** The idea of promoting home composting among residents, providing them with the necessary resources and education, is a form of social innovation that encourages sustainable practices at the household level. **Learning and New Capabilities:** By providing educational resources and workshops on home composting, the municipality fosters learning and the development of new capabilities among residents.

		Financing: If the municipality decides to subsidize compost bins for residents requires financing actions by the municipality or reducing the fees related to waste collection and treatment.
	Outcome (according to module B-1.1)	Reducing environmental pollution; Produce RE; Public health; City aesthetics; awereness and behavioral change; green jobs; efficient management; GHG emissions mitigation; increased property value. Early changes: Pilot projects on separate collection of the organic fraction of waste (household and commercial). Decrease the emission from landfills and produce RE. Late outcomes: The anaerobic digestion of organic waste and the conversion of used cooking oil into biodiesel would create sustainable resources, further contributing to a circular economy. Enhanced Soil Quality: Home composting would produce nutrient-rich compost that residents could use to enrich the soil in their gardens, promoting sustainable agriculture practices at a household level. Reduced Dependence on Fossil Fuels: The production of biodiesel from used cooking oil could contribute to a reduction in dependence on fossil fuels over time.
Implementation	Responsible bodies/person for implementation	Limassol Municipality; Department of Environment. In addition, the support from Information Technology experts for integrating smart systems like RFID or barcodes is required. Green Dot Cyprus (recycling). Citizens of Limassol play a vital role in sustainable MSW management.
	Action scale & addressed entities	Action Scale: Organic waste collection will be implemented across the entire Limassol municipality. Addressed Entities: All individuals living within the Limassol municipality will be affected by the scheme. Businesses: All businesses operating within the Limassol municipality will be included in the scheme. Municipal Departments: Various departments within the municipality are involved in the execution and monitoring of the scheme. Anaerobic Digester owners (Public and/or private).
	Involved stakeholders	• Limassol Municipality (administration and operational staff) • Department of Environment • Residents of Limassol • Sewage board of Limassol, • The board for operation the Penatkomo treatment plant, • Local businesses, particularly restaurants and food service companies, hotels, • Waste management service providers, • Biodiesel production companies, • Citizens.
	Comments on implementation	Implementation of the action will require careful planning, effective communication, and continuous monitoring. The success hinges on broad community participation, hence the necessity of a strong public awareness campaign to inform and educate residents and businesses about their roles and responsibilities. Continuous evaluation and feedback mechanisms should be in place to monitor progress, address challenges promptly, and make necessary adjustments to improve effectiveness over time. For the anaerobic digestion and biodiesel production programs, establishing efficient and convenient collection

		systems is critical. Educational and promotional campaigns will also be essential to encourage participation in the home composting program and the proper disposal of used cooking oil. Partnerships with local businesses could be beneficial in enhancing the effectiveness and reach of these programs.
Impact & cost	Generated renewable energy (if applicable)	The organic fraction of the separated waste, which includes food and garden waste, could be directed towards an anaerobic digestion process. Anaerobic digestion involves breaking down organic matter in the absence of oxygen, leading to the production of biogas - a renewable energy source. This methane-rich biogas can then be captured and used for various purposes such as heating, electricity production, and even as a fuel for transportation. Therefore, by effectively implementing waste separation and management practices, the Limassol municipality not only promotes sustainable waste management but also contributes to renewable energy production, further enhancing its efforts towards becoming a carbon-neutral city.
	Removed/substituted energy, volume or fuel type	According to available data on RE from organic waste in Cyprus (CYPRA-KEBE) 87.152 kWh are produced per ton of organic waste. Diverting 24779 tons/year of organic waste to produce RE will yield 2159 MWh of electricity.
	GHG emissions reduction estimate (total) per emission source sector	As estimated based on the available data, 54176 tons per year mixed MSW go to the landfill. GHG (tCO2eq) = **43341** (54176 tons x 0.8 tons CO2eq/ton MSW) + 6501 (15% x 43341; emissions for collection and transporation) = **49842** Reducing by 90% the amount of organic waste that goes to the landfill results to **-82.8% reduction in these emissions (41277 tons CO_2eq)**.
	Total costs and costs by CO2e unit	The Municipality estimates the costs for the equipment, materials and personnel to run the separate organic waste collection (plus renew of the old machinery, vehicles etc) to approx. 54 million euros (data available upon request). Accordingly, the cost for the GHG emissions mitigation is estimated to **1308 euros / ton CO_2eq.**

B-2.2.18: Waste Management and Circular Economy : Action 2_ Zero waste production (circular economy) in Lemesos (WA_2: Zero waste production)

Action outline	Action name	Zero waste production (circular economy) in Lemesos
	Action type	Infrastructure/awareness/education
	Action description	The action capitalizes the outcomes of Action 1, to go one step further to remove all the recyclable materials in the MSW (e.g., plastic, metals, textile, inert). This will lead to zeroing the amount of waste that goes to the landfills. It will follow a similar approach to action 1 (small projects and upscaling). Beyond this, the potential to establish material reusing and recycling facilities in Lemesos will be examined. As it is, PMD is collected, stored and exported to recycling factories in the EU (which increases GHG emisisons due to shipping transportation). Based on the upcoming "Pay-as-You-Throw" scheme the municipality must educate residents about the benefits of waste separation and employ smart systems for monitoring. One

		option is to use RFID or barcode technology, where tags on waste bins record collection events and transmit data to a central database. This enables precise tracking and measurement, crucial for charging residents or businesses based on their waste production. To promote the recycling of electronic waste and batteries, the municipality could offer credits or discounts to companies that collect certain quantities of such waste. Providing residents with accessible information about collection points for proper disposal is also important. Establishing a program for collecting garden waste, which can be used for composting or transported to a composting facility, should be actively promoted. Smart systems can enhance the convenience and accessibility of this initiative. Collaborating with Green Dot Cyprus, a producer responsibility organization specializing in packaging waste management, could be beneficial.
Reference to impact pathway	Field of action	Waste management
	Systemic lever	**Detailed description on B.1.1.** Technology/Infrastructure: Reduce waste production (The adoption of electronic billing, e-signatures, online platform for a waste exchange). The use of RFID/barcode technology and smart systems for waste monitoring and collection. Governance/Policy: The "Pay-as-You-Throw" scheme and incentive policies for waste collection companies manifest governance and policy action. The implementation of policies that minimize VAT for repair services to encourage refurbishment and discourage waste. Social Innovation: Educating residents about waste separation and providing accessible collection point information signifies social innovation. The creation of a waste exchange space where citizens can donate and choose items they need is an example of social innovation. Financing: Offering credits or discounts to companies for waste collection and investment in smart systems involve financial aspects. The potential reduction or coverage of VAT for repair services is a financial intervention that makes repair more affordable. Learning and New skills: Citizens educated about waste separation. Green jobs related to waste reduce/reuse/recycle schemes at the local, national and international levels.
	Outcome (according to module B-1.1)	Reducing environmental pollution; Produce RE; Public health; City aesthetics; awereness and behavioral change; green jobs; efficient management; GHG emissions mitigation; increased property value. Early outcomes: Reduce waste and increase reuse/recycling. Transitioning to electronic billing and e-signatures would lead to waste reduction. Improved accuracy and efficiency in waste collection and monitoring due to the use of RFID/barcode technology. Later outcomes:Landfill Diversion: The waste exchange space could lead to more items being reused rather than discarded, decreasing the amount of waste sent to landfills. Reduction of GHG emissions. Green jobs (recycling and reuse facilities). Companies adhering to the new "Pay-as-You-Throw" scheme and incentive

		policies. Enhanced sense of responsibility and ownership among citizens over local waste management. Novel digital technology in waste management processes. .
Implementation	Responsible bodies/person for implementation	Lemesos Municipality
	Action scale & addressed entities	The municipality takes the lead in overseeing implementation efforts, developing policies, and allocating resources. Local businesses, including technology, retail, and repair service providers, are addressed at the business scale. The community as a whole, including residents, educational institutions, and community organizations, is targeted at the community scale.
	Involved stakeholders	• Limassol Municipality (administration and operational staff) • Department of Environment • Residents of Limassol • Sewage board of Limassol, • The board for operation the Penatkomo treatment plant, • Local businesses, particularly restaurants and food service companies, hotels. • Industry • Waste management service providers, • Citizens.
	Comments on implementation	Implementation of the "Pay-as-You-Throw" scheme in Limassol will require careful planning, effective communication, and continuous monitoring. The success of the scheme hinges on broad community participation, hence the necessity of a strong public awareness campaign to inform and educate residents and businesses about their roles and responsibilities. It's crucial to ensure the RFID or barcode technology integration is smooth and reliable, facilitating accurate waste tracking and fair billing. Incentive programs for electronic waste and battery recycling must be economically viable to attract participating businesses. The collaboration with Green Dot Cyprus should be leveraged to maximize efficiency in packaging waste management. Continuous evaluation and feedback mechanisms should be in place to monitor progress, address challenges promptly, and make necessary adjustments to improve effectiveness over time. Switching to electronic billing and signatures will reduce paper waste and enhance efficiency, although adequate digital training for residents will be crucial. Encouraging repair through tax incentives is innovative, but careful fiscal management will be needed to avoid burdening the municipal budget. The creation of a waste exchange space promotes reuse, but success will rely on community participation and awareness. Establishing a supportive platform will require regular updates to ensure its efficacy. All these steps, if carefully implemented and monitored, can significantly contribute to circular economy in the Limassol municipality.
Impact & cost	Generated renewable energy (if applicable)	NA

	Removed/substituted energy, volume or fuel type	NA
	GHG emissions reduction estimate (total) per emission source sector	The removal of 90% of the organic waste and 75% of the recyclable waste from the landfill leads to a reduction of 65% in the waste that goes to the landfill. Moreover, avoide waste generation (e.g. e-billing, pay as you throw) will lead to -50% of the emissions related to waste collection and transportation. Removing of organic (and paper, textile, wood) waste will decrease emissions from the landfill. GHG (tCO2eq) = **43341** (54176 tons x 0.8 tons CO2eq/ton MSW) + 6501 (15% x 43341; emissions for collection and transporation) = **49842** Reducing by 90% the amount of organic waste and 75% of the recyclable material that goes to the landfill results to **-90.5% reduction in these emissions (45087 tons CO_2eq)**. Action 2 contribution to GHG emissions reduction is **4753 tons CO2eq.**
	Total costs and costs by CO2e unit	The Municipality estimates the costs for the equipment, materials and personnel to run the separate waste collection (plus renew of the old machinery, vehicles etc) to approx. 6 million euros (data available upon request). Accordingly, the cost for the GHG emissions mitigation is estimated to **1262 euros / ton CO_2eq.**

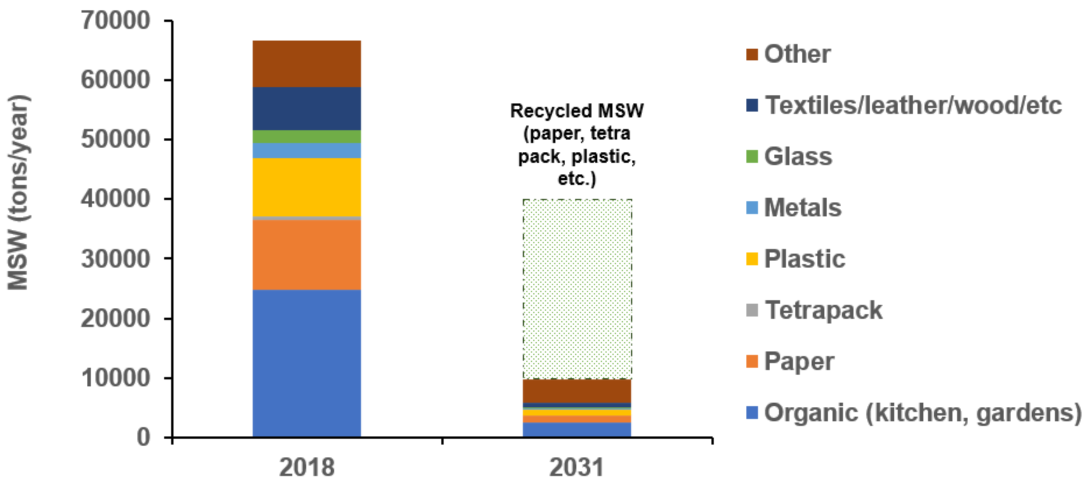


Figure 37. Municipal Solid Waste baseline and in 2031 (different waste streams)

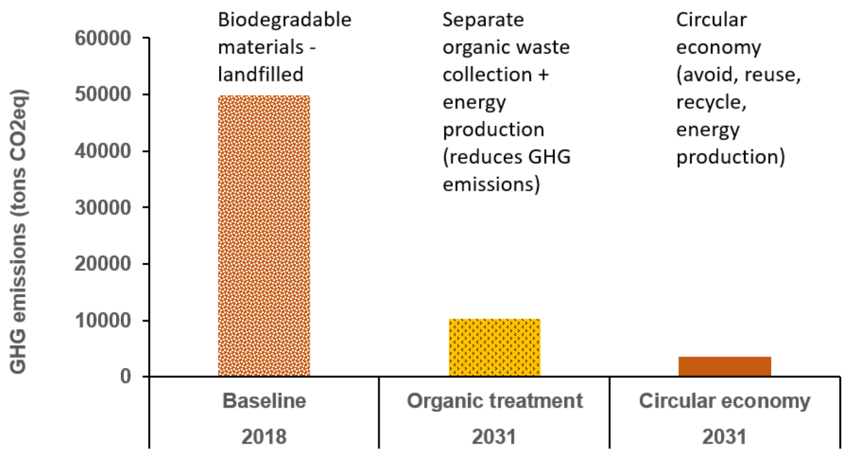


Figure 38. GHG emissions from MSW treatment options

B-2.2.19: Sea and Coastal: Action1_ Design and Development of Cold Ironing Infrastructure for the Limassol Port (CA_1: Cold Ironing in the Limassol Port)		
Action outline	Action name	**Design and Development of Cold Ironing Infrastructure for the Limassol Port**
	Action type	Infrastructure
	Action description	**Phase A: Current status documentation – preliminary calculations – Data collection** Conducting a feasibility study to document the conditions for the cold ironing study of the Limassol port involves a systematic examination of various factors. The study would typically assess the technical feasibility of implementing shore-side electricity infrastructure, considering aspects such as power supply availability, voltage requirements, and compatibility with existing ships. It would also evaluate the economic viability, including investment costs, operational expenses, and potential cost savings from reduced emissions. Environmental considerations, such as air quality improvements and greenhouse gas reductions, would be analyzed. In Phase A, a comprehensive examination of the port/ship interface will also be conducted. Additionally, stakeholder consultations, regulatory requirements, and potential challenges or constraints would be taken into account to provide a comprehensive analysis of the feasibility of cold ironing implementation in the Limassol port. Preliminary calculations will be based on:

		▪ The average consumption per vessel: An estimation of the average energy consumption per vessel during cold ironing will be determined based on historical data or industry standards. ▪ The average residence time in port per vessel: The average duration that a vessel stays in the port (residence time) will be determined based on historical data or industry knowledge. ▪ The energy requirement per vessel: The energy requirement per vessel can be calculated by considering the average consumption per vessel by the average residence time in port per vessel. **Timeline for Phase A: M1-M6** **Phase B: Quantifying Energy Consumption: Detailed Measurements and Analysis for Cold Ironing in the Port of Limassol** Detailed Measurements: Actual measurements will be conducted to gather accurate data on the energy consumption of vessels during cold ironing in the port. **Purpose of Measurements:** The purpose of conducting actual measurements is to obtain accurate and reliable data on the energy consumption, including fuel usage, of vessels during cold ironing. **Data Collection Process:** The measurement process involves installing equipment where applicable, as well as post processing of other data retrieved by fleet operators (MRV) and the port. Air quality measurements will also be conducted. **Data Analysis and Evaluation**: The collected data on energy consumption will be analyzed and evaluated to gain insights into the energy consumption patterns of vessels during cold ironing. The purpose will be to deliver an energy balance of the port, whereas the boundaries will include the port and the fleet accommodated. This analysis can involve comparing fuel consumption across different vessels, assessing the impact of various operational factors on energy efficiency, calculating average fuel consumption rates, and identifying potential areas for improvement. **Timeline for Phase B: M6-M18** **Phase C: Energy Mix Analysis and Plan Development for Cold Ironing** Phase C of the project focuses on the analysis of the measurements and the extraction of a plan based on different scenarios for the potential energy mix required to cover the needs in cold ironing at the Limassol port, towards carbon neutrality. The plan will consider the provisions of Directive 2014/94, which promotes the use of alternative fuels and renewable resources in the maritime sector. The emphasis will be on existing renewables, such as photovoltaic systems (PVs), and alternative fuels like hydrogen, which are both requested by the directive and suitable for the marine sector. The analysis will evaluate the energy consumption patterns obtained from the measurements, considering factors such as vessel types, average consumption rates, and residence times in the port. Different scenarios will be examined to determine the optimal energy mix that can meet the requirements of cold ironing while reducing emissions.

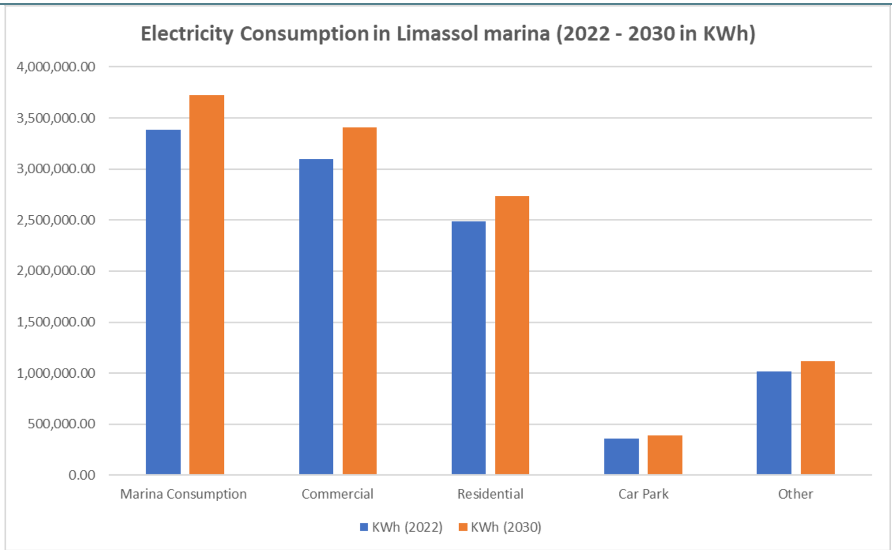
		As part of this Phase, an analytical technical documentation and cost estimation for the entire Onshore Power Supply (OPS) system, which will be included in the tender documents. Following the completion of the analytical electromechanical studies and estimation of the total capital and operational costs of the OPS, the subsequent step involves conducting a Cost Benefit Analysis (CBA) study, including a specific Social CBA to determine the social surplus resulting from the OPS implementation. Furthermore, Phase C will consider the needs for grid upgrade, including the potential requirement for substations. It will align with the 10-year plan of the Transmission System Operator (TSO) to ensure the energy infrastructure can accommodate the increased demand from cold ironing. **Timeline for Phase C: M12-M24** **Phase D: Final Policy Recommendation and Implementation Preparation** Phase D focuses on the final policy recommendation report, which will provide suggestions for future steps in implementing the cold ironing plan at the Limassol port. The report will consolidate the findings from the measurements, analysis, and energy mix assessment conducted in earlier phases. The policy recommendation report will outline the proposed plan for cold ironing implementation, including the specific energy mix, infrastructure requirements, and necessary upgrades. It will also consider the procurement process for acquiring the required equipment and services, as well as studies needed for the successful implementation of the plan. As part of this phase, a conclusive remark will be included, which will outline the various options available for implementing Onshore Power Supply (OPS) in the Cypriot Port/s. These options will definitely include Public-Private Partnership (PPP), the Cyprus Ports Authority (CPA), or the involvement of port operators, among others. The report will provide comprehensive guidance, including core tendering specification on selected plans, for stakeholders involved in decision-making, including port authorities, regulatory bodies, and energy providers. It will serve as a roadmap for the transition to sustainable and energy-efficient cold ironing operations at the Limassol port, aligning with the goals of Directive 2014/94 and contributing to the reduction of greenhouse gas emissions in the maritime sector **Timeline for Phase D: M18-M28** **Phase E: Procurement & Implementation (Y3-5)** **…**
Reference to impact pathway	Field of action	Coastal and Sea, energy
	Systemic lever	Technology/infrastructure. Governance/policy
	Outcome (according to module B-1.1)	

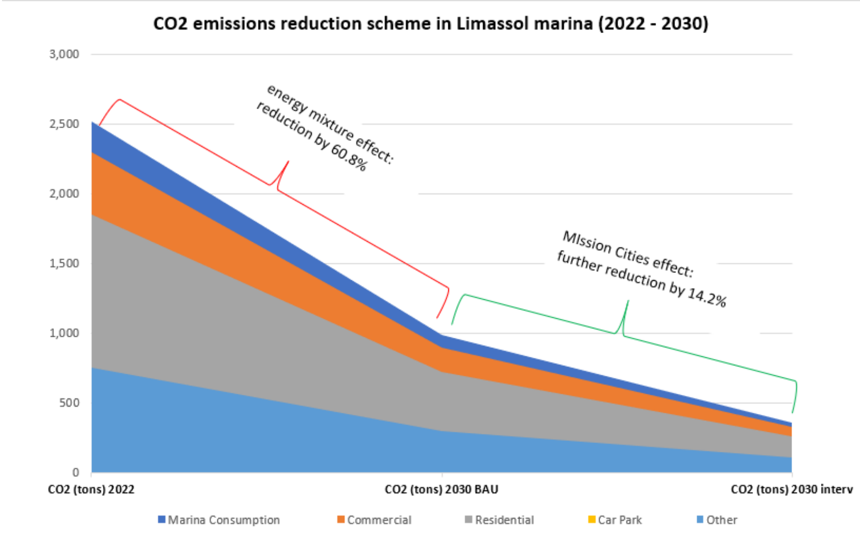
Implementation	Responsible bodies/person for implementation	This has to be the municipality or other relevant authorities, not taking in consideration who may do this
	Action scale & addressed entities	Implementation scope to be determined.
	Involved stakeholders	Port Authorities, Ship Owners/Operators, Energy Providers, Regulatory Bodies, EAC, TSO, DSO, Environmental Organizations, Local Community, Technology Providers, Financial Institutions
	Comments on implementation	Implementation approach and challenges to be assessed
Impact & cost	Generated renewable energy (if applicable)	Specific impact data and cost analysis to be determined in subsequent phases.
	Removed/substituted energy, volume or fuel type	55870 MWh (Marine Fuel Oil – Bulk estimate)
	GHG emissions reduction estimate (total) per emission source sector	**22.960 tn CO2**
	Total costs and costs by CO2e unit	Total for Phase A: €60,000 Total for Phase B: €120,000 Total for Phase C: €180,000 Total for Phase D: €40,000 Total Estimate for Phase E: €35mil (based on a budgetfor a similar case/port size for such implementation) **Total Action Cost Estimate: €35.4 mil.** ⇨ **1540 €/ t CO2e**

B-2.2.20: Sea and Coastal: Action 2_ Carbon Neutrality in Blue Infrastructure – The case of Limassol Marina (CA_2: Limassol Marina energy community)

Action outline	**Action name**	**Carbon Neutrality in Blue Infrastructure – The case of Limassol Marina**
	Action type	Infrastructure & governance
	Action description	The significant environmental, yet economic impact of the Limassol Marina, either for the city of Limassol, or the state of Cyprus as a whole, as well as the importance and the variety of activities, which take place either at sea or on land, makes the marina of Limassol an important "energy ecosystem" that needs to be separately monitored to achieve ultimate carbon neutrality. The marina ecosystem could become a "carbon neutral cell" within the city of Limassol, thus contributing to the major target, which is the City's Carbon Neutrality. Moreover, as a "green cell", Limassol Marina can

		become a "good practice" for similar infrastructure in Cyprus and abroad, while it will be the first carbon neutral marina complex in the Mediterranean Sea. The steps towards the ultimate target of transforming Limassol Marina into a "blue and green infrastructure" consist of the following actions: **Phase A (Activities):** • **A.1 Measuring and monitoring the emissions:** Develop a state–of–the–art methodology for measuring and monitoring the emissions that are emitted in Limassol Marina as an ecosystem. It includes analytical calculations regarding the energy consumed and the emissions emitted per main emission centre, i.e., residential part, yachting part (including land and sea activities), and commercial part. The outcome of the activity leads to the **development of a Carbon Index** particularly for CO_2 emissions by setting the Index at level 100 for 2022 (ultimate goal is the carbon neutrality rate to reach 70%-80% by 2030, i.e., the index to become 20%). Limassol Marina is divided into five (5) business streams. Taking energy consumption in 2022 as year basis, the electricity consumption is as follows: - Marina: 3.387.177 KWh - Commercial part: 3.094.488 KWh - Residential part: 2.485.603 KWh - Car park: 356.169 KWh - Other: 1.016.870 KWh - **Total (2022): 10.340.307 KWh** The calculated CO2 emissions for the year basis 2022 (electricity to CO2 emissions factor is considered as 0,744 KgCO2e/kWh[1]) are as follows: - Marina: 2.520 tons CO2 - Commercial part: 2,302 tons CO2 - Residential part: 1.849 tons CO2 - Car park: 265 tons CO2 - Other: 757 tons CO2 - **Total (2022): 7.693 tons CO2**

		 In our model, the electricity consumption is assumed to grow 10% by 2030 due to planned developments and despite the foreseen energy saving measures. It is also considered that the general CO2 emissions level is decreased because the electricity to CO2 emissions factor is reduced due to the implementation of natural gas and renewables into the energy mixture and is forecasted to be 0,265 KgCO2e/kWh by the year 2030. • **A.2 Calculating the energy supply / demand model** and the emissions emitted (SOx, NOx, PM, CO_2) in Limassol Marina, segmented into the different categories of users (i.e., yachts, residential part and commercial part of the complex). • **A.3 Conduct of CBA / SCBA:** for the alternative energy sources to be identified as contributing to the carbon neutrality process for the Limassol Marina. Along with the private cost and benefit, the social cost and benefit (social surplus), will be calculated and delivered to the society. The next graph, that concludes the rough estimation of the existing and anticipating emissions in 2030, is going to be further defined as a more analytical methodological tool. It will be developed to help the Marina Administration to better monitor and report the emissions on an annual basis.



A.4 The Action Plan

The Marina Action Plan towards carbon neutrality, includes the following actions:

- Investment in RES (mainly PVs), (connection to the grid).
- Investment in electric cars within Limassol Marina infrastructure
- Investment in electrical chargers for visitors
- Investment in Building Energy Management Systems (development of a single, central platform to manage buildings' energy consumption)
- Implementing "Energy Communities" as a synergetic tool for the implementation of the "carbon neutral policy" of the Limassol Marina.
- Training & Certification on Environmental Aspects for the Marina Operators and stakeholders
- Dissemination - Raising of awareness activities, as well as transfer of know-how for the other "blue" infrastructure in Cyprus and abroad

Phase B

- **B.1 Capital Investments implementation:** Financing and Implementation of the proposed Action Plan.

		The proposed approach is definitely a synergetic approach and involves many contributors, i.e., researchers, scientists, direct and indirect beneficiaries, public and private organisations which join forces towards the global target of reducing / offsetting the emissions and achieving carbon neutrality in Limassol Marina. The proposed project refers firstly to the accurate studies that are needed in order for "carbon neutrality" to be achieved for Limassol Marina. Phase A covers all possible aspects of the project (Technical, Feasibility, Environmental, and Social), while Phase B regards the project implementation itself. The whole project can be characterized as follows: • Specific: refers to a tangible infrastructure. • Measurable: Current emissions levels and the respective reductions from the proposed technology will be measured and quantified. • Achievable: Carbon offsetting through RES can achieve carbon neutrality • Realistic and Relevant: compliance with EU Green Deal and Mission Cities • Timed: Technology proposed is already in use
Reference to impact pathway	**Field of action**	Coastal and Sea, Energy
	Systemic lever	• Technology / infrastructure • Governance / policy • Social Innovation • Finance / funding • Learning / capabilities
	Outcome (according to module B-1.1)	**Early**: Maturity / Study period: Technology adoption; emissions monitoring, energy supply / demand model, financial resources identification **Later**: Carbon Neutrality, RES development; public awareness; compliance with Mission Cities activities
Implementation	**Responsible bodies/person for implementation**	**Phase A:** • Frederick University (Research Organization) • Limassol Marina (Data provider, investor) • Marina Tenants and stakeholders (data providers, co-investors) • Cyprus Institute (energy communities model development) • Municipality of Limassol (main beneficiary) • Electricity Authority of Cyprus (data contributor, energy capacity expert, regulations) • External Experts (specific studies) • Associate Partners (financiers, co-investors, etc)

		• Media (awareness, social awareness) **Phase B:** • Limassol Marina (Data provider, investor) • Marina Tenants and stakeholders (data providers, co-investors)
	Action scale & addressed entities	Phase A: 24 months Phase B: 36 months
	Involved stakeholders	• Marinas and Yachting industry • Private organisations • Public bodies (governmental or not) • NGOs and other Not-for-profit Organizations
	Comments on implementation	Parts of the implementation of this action (phase 3) will happen in synergy with the Smart and Digital Solutions of Limassol's CCC. A critical challenge is to involve end-users and stakeholders and to access sensitive data.
Impact & cost	**Generated renewable energy (if applicable)**	It is estimated as 4.1 m. KWh on an annual basis
	Removed/substituted energy, volume or fuel type	36% of the electricity needed is supplied by PVs. The total power to be installed is estimated at 2.3MW.
	GHG emissions reduction estimate (total) per emission source sector	Core target of the project is the development of the Carbon Index (value 100, basis year 2022), The RES investments will deliver an average reduction in critical emissions (CO_2, SOx, NOx, PM) at least by 70%-80% **5,770 t CO2e/yr**
	Total costs and costs by CO2e unit	Total action cost: **Phase A: 300k€** **A.1 Measuring and monitoring the emissions:** Timeframe: M1 – M6 Cost: 80.000€ **A.2 Calculating the energy supply / demand model and the emissions emitted** Timeframe: M3 – M7 Cost: 40.000€

		A.3 Conduct of CBA / SCBA Timeframe: M7 – M12 Cost: 80.000€ **A.4 Training & Certification on Environmental Aspects for the Marina Operators and stakeholders** Timeframe: M1 – M24 Cost: 50.000€ **A.5 Dissemination - Raise of awareness** Timeframe: M1 – M24 Cost: 50.000€ **Phase B: Capital Investment: 2.4 m. €** Timeframe: M24 – M60 Cost Analysis: The Marina Action Plan towards carbon neutrality, includes the following actions: • Investment in RES (mainly PVs), (connection to the grid). The following assumptions are considered: - An amount of 64% of the total KWh needed are supplied by the grid - The rest, 36%, is produced by PV installation, i.e., an amount of 4.1 m.KWh - It is assumed that every installed KW produces 1.800 KWh on a yearly basis, so the installed power in KW is considered as 2.287, or 2.3MW. The Marina manager has already identified areas within the complex that can host about 1 MW of PVs. - Considering a price of 700k€ per installed MW, the estimated cost for installing 2.3MW is estimated at the price of **1.7m€** • Investment in electric cars (replacement and replenishment w/ new tech efficient vehicles) within Limassol Marina infrastructure Estimated cost: **370k€** • Investment in electrical chargers for visitors Estimated cost: **200k€** • Investment in Building Energy Management Systems (development of a single, central platform to manage buildings' energy consumption) Estimated cost: **200k€**

		• Implementing "Energy Communities" as a synergetic tool for the implementation of the "carbon neutral policy" of the Limassol Marina. Estimated cost: **30k€** **TOTALS** Estimated Cost / t CO2e / € / CO2e Phase A: 300 k€ Phase B: 2.5 m.€ **Total: 2.8 m.€ / 5.770 / 488**

TOTALS

	Estimated Cost	t CO2e	€ / CO2e
Phase A	300 k€		
Phase B	2.5 m.€		
Total	**2.8 m.€**	**5.770**	**488**

B-2.2.21: Coastal and Sea: Action 3_MERA (CA_3: MERA)

Action outline	Action name	Mitigation of Risks to the Coastal Area through Technology Tools and Integrated Data Management (MERA)
	Action type	Infrastructure
	Action description	<u>**Phase A: Identification of Risk**</u> The bay of Limassol is surrounded by a number of industries and other anthropogenic activities that exert significant pressures and represent threats to sea and coast. These include Power Generation, Port Operations, Marinas, Fisheries and Aquaculture, Coastal Construction and Litter and Sewage, while gas exploration is expected to be introduced in the near future. Each of the 6 sections represent different threats that need to be identified and evaluated in terms of severity. At the same time, due to the high concentration of these industries their interactions are also significant and a holistic approach to risk assessment for complex systems must be employed. <u>**Phase B: Data Collection**</u> **B.1: Acquisition of Secondary Data** At the moment, several oversight and monitoring institutions collect data that are relevant to incident identification and pollution. Nevertheless, as these institutions operate independently, and with no established communication channels currently existing, the data remains highly fragmented and of limited

		use to anyone. As such, the project seeks to collect and consolidate this data and establish a route to data acquisition and integration from each relevant institution. **B.2: Generation of Primary, Real-time, Data** The significant lack of technology in the current practices of marine environmental surveillance in Limassol prevents the timely identification of polluting incidents and the identification of its source. As a result, the vast majority of incidents remain undetected and unpunished and the lack of information as to the source of the incident limits regulatory efforts to provide effective practices. In conjunction with parallel research projects the aim is to employ state of the art technology, including aerial drones, stationary underwater sensors and unmanned sea vehicles to collect real-time primary data and improve the capacity to detect and identify incidents. **Phase C: Development of analytical Framework** **C1: Data Consolidation** Matching data from varied sources can be challenging due to differences in frequency, measurement units, missing observations, etc. In this step, all data sources will be consolidated to produce a “clean” database that is useable, error-free and expandable. **C2: Risk Assessment Methodology** The quantification of risk requires a methodology that asserts the likelihood of risk and its impact, should the risk be realized. Such methodology is to be applied both at a sectoral as well as a holistic level. Furthermore, the risk assessment framework will provide measurable benchmarks that would trigger early warning signals should their threshold of safety be exceeded. **C3: Citizens’ wellbeing KPIs** As part of the continuous surveillance and monitoring of incidents, and the risk assessment methodology applied, a number of KPI’s regarding the environmental and socio-economic wellbeing of citizens shall be established. These may include (but not be limited to): o Gross Domestic Product o Gross Value Added o Employment o Amount of shipping traffic o Oil pollution at coasts, illegal discharges

		○ Water quality (salinity, turbidity, heavy metals, eutrophication, faecal pollution, pathogens, temperature variability) ○ Population within 50 km of the coast ○ Number of tourists per km of coastline ○ Contribution of tourism to local and national economy ○ Shoreline evolution ○ Coastal development ○ Access/participation in coastal recreational activities ○ Aquaculture production ○ Fish catch **Phase D: Migration to Urban Digital Platform (UDP)** The UDP online platform will be informed of the available data sources and the risk management/impact KPI requirements and will provide interactive tools for statistical analysis and visualization, and prediction. In particular, the Marine Environmental Risk Assessment Integrated Data Management system will migrate to UPD in the following stages: **D1: Data Hosting and Data Integration** Available Data identified in B1 and collected in B2 will be integrated and hosted on UPD. The MERA data will be matched with other relevant data as collected from other actions (i.e. energy). Data will become accessible to relevant stakeholder and channels for data augmentation and updating will be automated. **D2: Statistical Analysis and Visualization** Modules for descriptive statistical analysis and visualization of the data will be implemented in the UPD. This will provide a running “snapshot” of variables of interest to inform on the current state of the marine environment. Relevant users will access visualization tools through a dedicated dashboard. **D3: KPI Monitoring** D3 will periodically produce citizens’ wellbeing KPIs as those identified in C3. The frequency of the calculation of the KPIs will depend on the how often the data will be updated by primary and third-party data. The platform will highlight significant changes in KPIs and issue warnings should certain KPIs fall off pre-established thresholds. **D4: Smart Apps and Intelligent Modules** In D4 smart apps, powered by more advanced algorithms, including machine learning prediction models, will be deployed for purposes of risk assessment and prediction. Early warnings will be issued based on

		the output of these models, including probability of major polluting incident. At the same time, a mobile app will be provided for citizens to report in real time polluting incidences in bathing waters or the marina.
Reference to impact pathway	Field of action	Coastal and Sea
	Systemic lever	Technology / infrastructure Governance/policy Participation Digitalization
	Outcome (according to module B-1.1)	**Early**: Technology adoption; integrated emergency response plan; risk assessment **Later**: digitalisation; Marine pollution management framework; public awareness; synergies with hydrocarbon activities
Implementation	Responsible bodies/person for implementation	Limassol Municipality
	Action scale & addressed entities	24 months; end-users, stakeholders, public
	Involved stakeholders	Frederick University Cyprus Port Authority Deputy Ministry of Shipping Private organisations Commercial Shipping organisations Limassol Port Terminal Operators Limassol Marinas and Yachting, Fisheries and Aquaculture Oil and Gas exploration Coastal Construction Organizations Waste management organisations
	Comments on implementation	The project aims at providing the Urban Digital Platform with a working model of risk assessment, KPI monitoring and early warning system. Additional parts of the implementation will happen in synergy with the Smart and Digital Solutions of Limassol's CCC. A critical challenge is to involve end-users and stakeholders and to access sensitive data and to integrate fragmented data.
Impact & cost	Generated renewable energy (if applicable)	N/A

	Removed/substituted energy, volume or fuel type	
	GHG emissions reduction estimate (total) per emission source sector	Reduction of the number of polluting incidents to be calculated in natural numbers. Calculations will be based on the number of marine polluting incidents occurring annually, divided by the number of polluting incidents occurred in the baseline year 2022.
	Total costs and costs by CO2e unit	**Total estimated action cost: €200,000.** This includes the work for Phases A-C of the study as well as the cost for design, development, testing and deployment on the Urban Digital Platform, the procurement, set-up and integration of sensors and autonomous systems and the training of the responsible stakeholders for the relevant platform module use.

B-2.2.22: Coastal and Sea: Action 4_RECONE (CA_4: RECONE)		
Action outline	Action name	RECONE_ RESILIENT COASTAL NEIGHBOURHOODS
	Action type	a. Social Innovation b. Governance/ policy
	Action description	The project focuses on the assessment of one of the seven (7) coastal neighbourhoods of the Municipality of Limassol to define their resilience level in terms of their specific environmental, social, and economic challenges and their ability to support the 15 minutes neighbourhood model. The 15 Minute Neighbourhood which supports the notion of the Healthy Neighbourhood involves policy actions that provide residents access to most, if not all, of their needs within a short walk or bike ride from their home. It's based upon four pillars: Proximity, Diversity, Density, Ubiquity where policies transform urban spaces into connected and self-sufficient (or 'complete') neighbourhoods reducing car use and encouraging active travel are central to delivering the vision. The overall aim of the 15 minuet City is to makes life more liveable for residents, by improving air quality and making neighbourhoods safer, quieter, more diverse, inclusive and economically vibrant. Additionally, the project aims to connect the coastal residential quarters to the sea, the coast and the beach in order to maximise the positive impact of this amenity and the degree of daily needs satisfaction within the 15 minutes radius. There will be the potential to enable behavioural changes, individual preferences, consumption habits, lifestyles, which in parallel to the improvements of associated infrastructure to bring the particular place closer to the requirements of the European Green Deal and the New European Bauhaus initiative.

		Proposed Actions: **1. Change Management Programmes (partially directly measurable)** Years 1-2: open calls for neighbourhood meetings – generation of focus groups • Attempt to define through workshops the possibility of generating / enhancing the sense of community and the take up of pilot projects = educational = **no measurable emissions** • Change of Travel patterns – Based on the studies such as 'The Net Sustainability Impact of Shared Micromobility in Six Global Cities' (Kraussa, Dolla and Thigpen, 2022) by the German research institute, Fraunhofer ISI in which Researchers found that trips on shared e-scooters over 2022 reduced carbon emissions by 15 – 42 grams of CO2 equivalent per kilometre. The action aims to reduce the need to travel with private car (measure travel distances of 30 participants over a period of 6 months) = **measurable emissions** https://www.isi.fraunhofer.de/content/dam/isi/dokumente/ccn/2022/the_net_sustainability_impact_of_shared_micromobility_in_six_global_cities.pdf • Reduce Energy Consumption – Based on studies such as – Darby, S. (2006) Carroll, J. Lyons, S. Denny, E. (2014), The 2013 Horizon Research Project NOBEL, McCoy and Lyons (2017) in the home through change of habits. Install metering facilities in 30 homes – measure for 3 months – measure again by implementing a different use of the home technology infrastructure. = **measurable emissions** **Note:** Cyprus is significantly behind on the rollout of smart metering. As such references have been draw from EU countries at the beginning of smart metering and their substantial effects on reduction of KWH usage. McCoy, D., Lyons, S. Unintended outcomes of electricity smart-metering: trading-off consumption and investment behaviour. Energy Efficiency 10, 299–318 (2017). https://doi.org/10.1007/s12053-016-9452-9 Carroll, J. Lyons, S. Denny, E. (2014) Reducing household electricity demand through smart metering: The role of improved information about energy saving, Energy Economics, Volume 45, 2014,Pages 234-243,ISSN 0140-9883, https://doi.org/10.1016/j.eneco.2014.07.007.

		S. Darby, "The Effectiveness of Feedback on Energy Consumption: A Review for DEFRA of the Literature on Metering, Billing and Direct Displays," Environmental Change Institute, University of Oxford, Oxford, 2006. • Passive climatic design of private open space (gardens) – participatory design for the design of private gardens 10 (homes) designing and implementation of shading and soft surfaces = temperature changes can be measure and assumptions can be made in how much cooling or heating the house can save= **indirect measuring of emissions** Year 3-5: – select more successful pilots/expand the programmes/secure funding /implement at a neighbourhood wide scale. **2. Social Inclusions / Support of Micro-economies (non-directly measurable) - Two actions** 1. Support Small Scale Industries. Year 1: – Design Development of Ideas and Identification of Opportunities • Start-ups centre (mainly services and social innovation) – affordable co working space to support two aspects – reduce the need to travel. **= non-direct measurables in terms of emissions** • Investigate through meeting the possibilities of supporting local businesses. Year 2-3: Delivery of the start-up innovation centre - monitor progress - set up a future self-sustainable management programme. **= non-direct measurables in terms of emissions** Year 3-6: Expand practice across Limassol neighbourhoods – find sponsors 2. Integration of Immigrant Groups Year 1: - Institutional support and partnership, working directly with local government and municipalities to: A. Improve the coordination of policies and promoting dialogue at various levels B. Provide a mechanism to match migrant skills with local job opportunities Year 2-3: C. Source EU funding for events for community building and incorporation of migrant groups D. Design of events to incorporate, welcome and engage all members of the community through open calls (eg. Fun and exciting activities, mutual appreciation events to maximise strengths, common goals and appreciation of one another and shared ownership) Year 4-5: E. Implement community events within the community centre (see below) F. Monitoring of Utilisation and Measuring change in relation to direct and non-direct measurables

		3. Environmental improvements projects (not directly measurable) - Two projects **Two potential projects –** aiming at supporting the sense of community and therefore the 'functioning' of the city and the environmentally sensitive behaviour of users 1. Generating a Centre – a reference point for the community. Reflect the sense of neighbourhood and collectiveness in a physical project through the refurbishment of a small public space all identify as 'the centre' or even the refurbishment of a historic buildings as a key local amenity (i.e. day care centre, community gathering space, co working space). A space resident could call 'home' beyond the local church. Year 1: Surveys, identification of opportunities, residents' workshop in order to develop the brief. Year 2: Secure funding and prepare commissioning package Year 3: Delivery Year 4: Monitoring of Utilisation and Measuring change in relation to direct and non-direct measurables 2. Investigate the opportunity of reconnecting the neighbourhood to the coastline. (paraliakos crossing, a 'local destination' on waterfront.
Reference to impact pathway	Field of action	Costal and Sea, buildings, transport, energy
	Systemic lever	*a.* Social Innovation *b.* Governance/policy
	Outcome (according to module B-1.1)	RECONE promotes a variety of outcomes both long and short term. In the short term, a change in attitude, behavioural patterns and a stronger sense of community aim to be achieved, through the education of residents in their part for working towards a CNC and more sustainable neighbourhood. Through co-design and participatory workshops residents will take their responsibilities toward energy consumption and emissions. Pilot programmes will introduce the value of behavioural change (walking - reducing electricity consumption etc) all of which are measurable with short timeframes. In turn outcomes will promote better health and wellbeing. Collaborative actions can signpost common goals, generate a sense of a new for Cyprus multicultural community

		In the longer-term residents will be provided access to services especially those related to the coast, locally through improvements of associated infrastructure, bringing the public back to the local and bringing us closer to European Green Deal and the New European Bauhaus initiative. Further this will lower transport emissions and provide better air quality, more green spaces and in turn boost the local economy.
Implementation	Responsible bodies/person for implementation	Municipality, NGOs, Local authority, Local residents action group
	Action scale & addressed entities	Design and selective delivery of components of pilot projects as catalysts towards a neighbourhood regeneration programme/ design community let design for environmental improvement projects and reconnection with the sea and the coast
	Involved stakeholders	Municipality, local residents, local institutions and voluntary/charitable groups, Industry Sponsors, relevant central government services
	Comments on implementation	Small scale actions will aim at piloting change. The majority of the programme will focus on capacity building for the community in order to design and claim changes within their local environment. Designing and maturing environmental improvement programmes through community let initiatives will overcome a key problem a lot of organisation have in claiming associated EU and national funding mechanisms
Impact & cost	Generated renewable energy (if applicable)	n/a
	Removed/substituted energy, volume or fuel type	Pilot programmes on change of travel patterns, use of energy metering and cooling/greening of private open space will indicate possible shift in energy consumption per household.
	GHG emissions reduction estimate (total) per emission source sector	At present many of the actions proposed do not have direct measurables. It is a mixture of direct and indirect actions which contribute to the overall healthy neighbourhood. There will be the potential to enable behavioural changes, individual preferences, consumption habits, lifestyles, which in parallel to the improvements of associated infrastructure to bring the particular place closer to the requirements of the European Green Deal and the New European Bauhaus initiative. Early Pilot projects will aim at identifying which of aspects of neighbourhood lifestyle can be more effectively impacted upon through the introduction of either technologies, attitudinal change or shift in the structure of the amenity base. Pilots will measure/model a 'before and after' condition from which figure can be extrapolated overall consumptions, reductions etc and contributed toward a very much need database of hard data. Such data can inform policy change and wider scale actions.

		Change Management Programs Directly Measurable: **B. Change of Travel patterns** – Transport: Researchers found that trips on shared e-scooters over 2022 reduced carbon emissions by 15 – 42 grams of CO_2e per kilometre. Assuming: 663 cars per thousand inhabitants and a total of 689,893,467 passenger Km (pKm) annually for a population of 107k (2020) For 6500 inhabitants in quarter (Zakaki estimate) => 6.5/107x689,893,467 = 41,909,416 pKm Anticipated reduction by 20% of Km travelled =>8,381,883 pKm reduced per year Median of 15-42 = 28.5 grams of C02e/pKm => 8,381,883 pKm x 28.5gCO2e / 1^6 = **239 t CO2e reduction** **C: Metering facilities:** based on 2020 consumption levels, in years 1-2 of residents changing habits in the home, households would reduce emissions by 10%-20% within pilot programme participation (with the potential to be even higher) (**364 -728 kWh per household per year**) which will continue to reduce within years 3-6 and beyond as further actions are implemented. Assuming an average reduction of 546 kWh per household per year and the 2030 projected GHG emissions intensity of 230 g CO2e/kWh => **125.6 Kg CO2e/yr/household** For the PILOT and a total of 30 houses => **3.8 t CO2e/yr** If this is **applied to a Whole Quarter** with the below assumptions: approximately 6,500 persons, with 2.6 persons per household => 2500 houses. The total Quarter reduction in GHG would then be: 125.6 Kg CO2e/yr/household x 2500 = **314 t CO2e/yr** **D: Participatory design for the design of private gardens** This action will reduce temperature of the garden by 3 degrees, subsequently the internal temperature within the house will reduce and this needs to be translated into energy saving. Private garden design needs also to adapt to the seashore microclimatic conditions. In addition, people can spend an extra 2 hrs. on average per day in the garden again reducing the need for energy (Air-conditioning etc.) within the house. Assuming a 10% resulting reduction in energy consumption, the 2020

		average per household consumption of 3640 kWh/yr and the 2030 projected GHG emissions intensity of 230 g CO2e/kWh => **83.7 Kg CO2e/yr/household** For the PILOT and a total of 30 houses => **2.5 t CO2e/yr**
	Total costs and costs by CO2e unit	**<u>Action Costs:</u>** **<u>1. Change Management Programmes</u>** **<u>Year 1-2:</u>** <u>A:</u> start up workshops – organised working groups around the 3 pilot programmes – several workshops each including collection of base line data, development of methodologies, constructing databases (10,000 euros) <u>B:</u> Measure travel patterns of 30 participants over a period of 6 months including monitoring before / after - to include installation of electric mechanisms on bikes, purchase of scooters etc (40,000 euros) For the Pilot Scheme of 30 participants <u>C</u>: Install metering facilities in 30 homes – measure for 3 months – measure again by implementing a different use of the home technology infrastructure including monitoring before and after and working with the community (20,000 euros) For the pilot scheme of 30 homes D: Participatory design for the design of private gardens 30 (homes) including the remodelling of 15 back gardens through participatory design (150,000 euros) For the pilot scheme of 30 homes **Total budget: 220,000 euros** *Budget are approximate and need further development.* **<u>Year 2-4:</u>** A: Selected pilots/expand and implement at a quarter wide scale of 2470 homes - Exact *Budget to be determined at a later stage*, but a rough estimation assuming some economies of scale and full replication of the above bring the budgeted cost to about **€11 mil**. **<u>2. Social Inclusions / Support of Micro-economies</u>**

		<u>Part 1: Support Small Scale Industries.</u> <u>Year 1:</u> A: Investigate Start-ups centres/affordable co-working spaces, advertise calls for ideas on new business initiatives. Investigate through meeting the possibilities of supporting local businesses. Identify a physical expression of such initiative in the form of a centre for the community and knighthood = 20,000 <u>Year 2-3:</u> A. design and delivery of the start-up innovation community centre (assuming a conversion of an existing building and/or associated events space 250,000euros). If possible the Blue Innovation Center would be used. B. support the centre with service infrastructure and Monitor progress over the period of 1 year including support staff and expert consultancy time, (50,000 euros) C identify draft and promote neighbourhood regeneration model (applicable to wider scale) and suggest policy changes to support it. (15,000 euros) **Total budget: 335,000 euros** *Budget are approximate and need further development.* <u>Part 2: Integration of Immigrant and vulnerable Groups</u> <u>Year 1:</u> Desk top study and survey programme to develop the coordination of policies on social integration and the development of programmes and actions suitable to the local condition. Identify mechanisms to match immigrant skills and local job opportunities (15,000 euros). <u>Year 1-2:</u> Design and organise events including participation in the actions above – 2 events per year over a period of two years. (40,000 euros) **Total budget: 55,000 euros** *Budget are approximate and need further development.* There is an assumption that after two-year cultural initiatives and events will be able to identify alternative funding options. **<u>3. Design development of environmental improvements projects</u>**

Year 2-4

Urban regeneration is inevitable associated with the provision of added amenity as well as environmental improvement of places within the neighborhoodlike at locations a new collective culture expresses itself. Especially establish a functional relation of the neighbourhood with the sea, the coast and the beach.

Community led design takes longer than conventional project and associated with a number of community actions valuable for consensus buildings and decision making, across often diverse community groups.

Participatory design does not feature within the planning and/or design practice in Cyprus and neighbourhood regeneration programmes focus solely on the refurbishment of built space as scenery and less an active event loaded working part of a city as a life organism.

This action assumes two urban regeneration projects defined and design through participation of local stakeholders

1. The generation of 'centre' for the community (probably in the form of a building /shelter of an existing structure with local cultural significance. It is also important to create a linkage of this centre with the sea, the coast and the beach as the essential elements of a coastal neighbourhood identity.
2. A project focusing on the reclamation of the neighborship's waterfront – associated with improved access, added amenity, personalisation of fit out etc.

The work associated with the facilitation and maturing of the projects is assumed at 5-10% of associated budgets (approx. 70-100,000 euros in total)

Total budget: max 100,000 euros

Budget are approximate and need further development.

Summary Table - Cost per ton of CO2e reduction

Actions		Total CO2e Reduction Year 1-4 (tons)	Total Cost Year 1-4 (€)	Cost per ton CO2e Reduction (€/ton CO2e)
	A		10,000.00	
Change Management Programmes	B	184	2,350,000	**9,010**
	C	633	1,200,000	

	D	417	7,550,000	
Social Inclusions/Support of Micro-economies			335,000	
			55,000	
Design development of environmental improvements projects			100,000	
Totals		**1234**	**11,610,000**	

B-2.2.23: Coastal and Sea: Action 5_Assessing carbon stock and sinking potential of seagrass meadows in Limassol coastal waters and pilot restoration (CA_5: Seagrass meadows in Limassol-carbon sinking and meadow restoration)

Action outline	Action name	Assessing carbon stock and sinking potential of seagrass meadows in Limassol coastal waters and pilot restoration.
	Action type	Environmental Assessment and Restoration Technology / infrastructure Governance / policy Social Innovation Learning / capabilities
	Action description	*Posidonia oceanica* meadows are significant carbon sinks. They are known as “Blue Carbon ecosystems” and are very important for mitigating climate change. Despite their importance they are disappearing quickly and degradation affects their capacity to sequester and accumulate carbon. The vast stocks of CO_2 that accumulated over hundreds and thousands of years could be at risk of being released back to the atmosphere contributing to the total EU emissions. It is thus crucial to take actions to conserve, restore or enhance the carbon sequestration potential in these coastal ecosystems.

		The incorporation of Blue carbon programmes into climate change strategies still lacks knowledge on the extent of the capacity and variability of these ecosystems, the development of policy instruments such as carbon offsets, and the ability on how to best develop coastal environmental management frameworks at local and national scales. Our project aims to fill these gaps and consists of the following actions: A1. Identify main pressures and consultation with stakeholders; A2. Assessment of carbon stock in seagrass meadows of Limassol; A3. Assessment of health condition and carbon sinking rates in seagrass meadows; A4. Develop a monitoring plan using multiple permanent plots established at the lower and upper limits; A5. Pilot restoration of affected *P. oceanica* meadows; A6. Citizens engagement in monitoring and restoration activities; A7. Monitoring of restoration success; A8. Policy reforms (prerequisite); A9. Educational material and public awareness.
Reference to impact pathway	Field of action	Coastal and Sea
	Systemic lever	• Environmental Assessment and Restoration • Technology / infrastructure for restoring seagrass • Governance / policy reforms • Social Capital • Learning / capabilities
	Outcome (according to module B-1.1)	• Calculate carbon sinking rates and carbon stores. • Mitigate damage and protect the dominant blue carbon habitat. • Restoring seagrass meadows can reduce carbon emissions of degraded meadows and increase carbon sinking. • Raise awareness that will lead to more responsible management.
Implementation	Responsible bodies/person for implementation	• Limassol municipality, • Department of Fisheries and Marine Research
	Action scale & addressed entities	• For assessment of C sinking by *Posidonia oceanica* and protection of this blue carbon habitat the activity will encompass the whole Limassol Bay • Restoration pilot activities will be initially performed over small spatial scales.
	Involved stakeholders	• Marine & Environmental Research (MER) Lab • Frederick University • Other Governmental departments (e.g., Department of Environment) • Researchers from other entities • NGOs and Non-profit organizations

		• Industries that affect seagrass meadows (coastal developments like port and marinas, hotels shipping /anchoring, fishers, power plants and desalination units, energy infrastructure including marine jetties, etc.,) • Citizens and volunteers
	Comments on implementation	• Funding required to implement the above can exceed €1 million, therefore the most important aspect is to raise funds. • Transplant trials across EU are still at RTD stages. • Infrastructure to grow seedlings will be needed.
Impact & cost	Generated renewable energy (if applicable)	Non applicable, unless the option to use the dead leaves washed ashore to generate biofuel is applied.
	Removed/substituted energy, volume or fuel type	By mitigating seagrass damage and by restoring blue carbon habitats, massive amounts of carbon can remain locked in seagrass roots (matte)
	GHG emissions reduction estimate (total) per emission source sector	Increase C sinking potential. Impossible to give a reliable estimate at this point. It is estimated that carbon fixation can be >1 ton C per hectare per year, carbon stock in the matte might reach >1500 tons of C per hectare.
	Total costs and costs by CO2e unit	Difficult to quantify at this point. This activity (assessing, monitoring, conserving and restoring) seagrasses of Limassol is likely to emit more CO_2 than absorb, at least in the short term. If conservation and restoration is feasible then a rough estimate of the average annual carbon fixation and sequestration rate based on the literature has a total fixation rate of 1,302 t C ha^{-1} yr^{-1} and a sequestration rate of 278 t C ha^{-1} yr^{-1}. Costs to implement a holistic project that aims to conserve several hectares that exist in Limassol coastal front and restore about a hectare of seagrass can easily exceed €1 million.

B-2.2.24: Coastal and Sea: Action 6_ Wave Energy Harnessing for Water Desalination (CA_6: Wave energy production)

Action outline	Action name	Wave Energy Harnessing for Water Desalination
	Action type	1. Infrastructure development 2. Innovative RE resource exploitation 3. RE generation
	Action description	One alternative towards decarbonisation is the exploitation of wave energy. Although not an off-the-shelf solution, the technology and expertise exist but need to be quantitively and otherwise examined.

		The coasts should be regarded as a community that engages many parties and stakeholders ranging from social, recreational, business, and touristic activities. Wave energy, being the most abundant renewable energy source, can contribute immensely if a commercial, economically viable, low electricity cost generation Wave Energy Converter (WEC) is deployed. Having 15-20 times more available energy per square metre than wind or solar, five times greater power flow intensity as well as being more persistent than wind power flow, justifies why wave energy has for many decades attracted inventors to harvest it by improvising various devices and mechanisms. It is estimated by the world energy council that the exploitable energy potential is at 2 Terra Watts (TW). The global wave power available including open oceans, however, is estimated to be of the order of 10 TW, figures well comparable with the world's present power consumption. It was as early as 1799 when the first patent for wave energy conversion system was made by the French Monsieur Girard and his son. Their invention aimed at exploiting mechanical energy directly to drive saws, mills pumps and other heavy machinery. The objectives of this concept are about a renewable energy system that harnesses the wave energy and will help aid the way for a clean energy transition and decarbonisation for Limassol's coastal regions and Limassol in general. Solar energy is of course another renewable energy that can be exploited; however, wave energy is perhaps in more abundance and more practical to exploit along the coastline. Although the applications of the wave energy harnessing are numerous, this conceptual idea focuses on water desalination, not excluding other application that could be exploited during the early outcomes. The objectives are: 8. To exploit water waves near the coasts to: a. acquire data for the wave potential around Limassol coastal region. [*] b. develop, based on environmental-impact assessment, projects promoting a renewable and cost-effective water-resource management towards decarbonization. c. Carry out the required technical and economic for the optimum WEC penetration, impact, and implementation. d. Obtain the required licenses from responsible municipal/governmental departments/authorities. 2. To deploy an existing wave energy converter mechanism for off-shore and on-shore use, based on integrated optimization of mechanical and hydrodynamic specifications, end-use purpose, and environmental impact assessment issues. The WEC may be used for water desalination (aim of this action) or electricity generation with numerous uses. 3. Design and test pilot specimen in the sea water field and re-assess field optimization-based design for larger scale implementation. The WEC will be able to handle extreme condition scenarios ranging from incident wave power levels originating from flat seas to those levels generated from stormy weather conditions, constituting viable and reliable operation. Another advantage of the WEC is the low electricity generation cost that will add to the system's viability.

		Regarding the cost, we estimate the WEC pilot desalination system (6x100 metres) will be in the range mentioned further down in the table. The cost estimate includes: -Manufacturing Pilot Prototype (based on a Cyprus SME developed system), -Data Acquisition/Analysis/Reporting, -Design/Material Optimization, -Desalination Filter System/Pre-filtration, -Deployment Costs, Anchoring.
		Scaled Up (Group 1) System: The cost of the scaled-up system (Group 1), its cost and accurate impact will be evaluated during the testing and evaluation phase of the pilot system.
		Certainly, wave energy technologies are still to a lesser or greater extent far from maturity. The potential for improvement of the techno-economic indicators of wave power conversion technologies is very large, while the survivability and the reliability of many devices, particularly for offshore operation, has still to be demonstrated.
		
		[*] Using an annual data set from Zygi (3h time step) and SWEL's neutral displacement theory model which extrapolates data from previous EU testing campaigns the potential for a typical Cyprus climate has been projected (spreadsheet with data and model calculations is available if required).
		
		Considering the outputs of the system in the case study (assuming correctness of Zygi data and a 148,000 tonne per year output) we can conclude that;
		• The optimised wave energy converter system [WEC] **suited** to the climate we have in Limassol is suitable for contributing to the goals of the project;
		  ○ This system would output water which with conventional desalination corresponds to circa 500 MWh / year. Assuming an electricity cost of 30c/kWh this is a 150,000 euro cost of electricity **only** using conventional desalination methods which produce emissions.
		  ○ With the wave energy converter there would be near zero emissions.
		  ○ This is for one system, more systems would have a larger positive impact.
		• Jobs will be created.
		• It will be the pioneer in this industry and will launch in Limassol brining huge media attention which we already have lined up (Reuters)
		• The proposal will be verified and evaluated with the pilot test system and subsequently move on to scale up and optimize the system to bring the costs down even more and outputs up.
		
		Basis of calculations
		• Almost 50 million cubic metres (m^3) of desalinated water were produced in 2021 in Cyprus **Error! Reference source not found.**. The energy consumed to generate 1 m^3 of desalinated water is 3.2 to 4 kWh depending on the desalination unit. The unit in LARNACA for example is capable to produce 58 thousand m^3 of desalinated water per day, 1.74 million m^3 per month, 5.568.000 kWh of consumed energy per month. This accounts to 1.6% of the total energy generated in Cyprus for 2020.

		• In 2020 in Cyprus, the emissions for every final electrical kWh consumed was 0.874 kg CO_2e **Error! Reference source not found.** . • In 2020, the total energy generated by conventional power generation units in Cyprus was 4.246.106 MWh **Error! Reference source not found.** and the total emissions in tonnes CO_2e were 4.246.106 x 0.874 kg CO_2e = 3.71 tonnes CO_2e **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**. • The proposed pilot wave energy converter system (6x100 meters) is capable of generating around 30 m^3 of desalinated water per hour. This corresponds to 30 m^3 x 8h x 4 kWh/m^3 = 960 kWh savings per day or 0.84 tonnes CO_2e reduction in carbon emissions **Error! Reference source not found.**. • With regards Water Supply; Sewerage, Waste Management and Remediation Activities, Limassol consumed 1.390.000 kWh **Error! Reference source not found.** or 1215 tonnes CO_2e. • The share of Limassol's emissions towards the total of the island in the electricity sector is 468.477 MWh or 409.449 tonnes CO_2e **Error! Reference source not found.** which corresponds to 10% of the islands total electricity production for 2020, **Error! Reference source not found.**. • Limassol consumes around 18 million m^3 of water per year **Error! Reference source not found.**. Around half of this come from water desalination units **Error! Reference source not found.**. This accounts to 27.000 MWh of consumed electrical energy or 23.600 tonnes CO_2e, 5.8% of Limassol's total CO_2e emissions. • From **Error! Reference source not found.**, Limassol consumes 6.210 MWh for Water Supply; Sewerage, Waste Manag. and Remediation Act. [E] or 5.427 tonnes CO_2e, 1.3% of Limassol's total CO_2e emissions. • The optimised WEC system for desalination would provide savings in the order of 500 MWh per year or 1.85% to 8% emissions reduction (of the emissions for water desalination) **Error! Reference source not found.-Error! Reference source not found.**. **References** [1]. SWEL and the WAVELINE MAGENT presentation, 2022 [2]. https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer [3]. https://www.enerdata.net/estore/energy-market/cyprus/#:~:text=Cyprus%20Related%20Research&text=Electricity%20consumption%20per%20capita%20was,a%205.6%25%20drop%20in%202020. [4]. https://ourworldindata.org/grapher/carbon-intensity-electricity [5]. https://app.electricitymaps.com/map [6]. https://www.wbl.com.cy/el/page/home

		[7]. https://tsoc.org.cy/ [8]. http://www.moa.gov.cy/moa/wdd/wdd.nsf/index_gr/index_gr?opendocument [9]. Cyprus Energy Agency, Baseline emissions inventory 230509.xls
Reference to impact pathway	Field of action	Coastal and Sea/energy
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	**Early Results** 1. Reporting on the technical and economic evaluation for the optimum WEC penetration, impact and implementation. 2. Permits and licensing for the deployment of the pilot WEC. 3. Pilot WEC system in the sea water. **Later results** 1. Deployment of larger scale RES WEC 2. market integration 3. real time performance monitoring/ emissions impact
Implementation	Responsible bodies/person for implementation	Limassol municipality
	Action scale & addressed entities	Deployment of pilot WEC system, dimensions 6x100 metres, in the open sea, water development department
	Involved stakeholders	1. Limassol municipality, 2. Deputy ministry of Shipping, 3. Department of fisheries and maritime research, 4. Water Development Department, 5. Department of Environment, 6. Planning authorities, 7. Electricity Authority of Cyprus 8. Department of Energy, 9. Water board of Lemessos, 10. Cyprus based SMEs (e.g. SWEL)
	Comments on implementation	Perhaps the most difficult parameter for implementing this RES technology will be to obtain the necessary permissions from the various governmental departments and authorities. The technology is ready for deployment if the required funding to carry out final technical and economic studies, and physical installation of the system are found
Impact & cost	Generated renewable energy (if applicable)	Wave energy for water desalination
	Removed/substituted energy, volume or fuel type	Conventional electrical energy generation (oil/mazut heavy-fuel oil)

	GHG emissions reduction estimate (total) per emission source sector	**The pilot WEC desalination system, 6x100 metres** 230 tonnes CO_2e, 1% to 4.2% reduction of Limassol's estimated emissions for water desalination **The optimised scaled up WEC water desalination system, 1152 m^2** **437 tonnes CO_2e, 1.85 % o 8% reduction of Limassol's estimated emissions for water desalination** **Note: data of energy consumed for water desalination vary.**
	Total costs and costs by CO2e unit	Estimated total cost for the WEC pilot desalination system (6x100 metres): **€1.7 mil.** Total cost by CO_2e unit: **€3890/ton CO2e**

B-2.3: Summary strategy for residual emissions

The AP strategy includes two pillars to offset residual emissions (20% of the baseline), which also maximize co-benefits for the city: 1) Carbon sinking in Seagrass meadows and 2) C sequestration in green infrastructure.

C sinking in seagrass meadows

Seagrasses are essential marine ecosystems that exist in Limassol but although they are endemic and protected by several regulations/conventions, they have been significantly impacted and are regressing. Seagrasses provide valuable services (provisioning, regulating and cultural) such as supporting fisheries and recreation, purifying the water and protecting coastlines from erosion. They represent perhaps the most important C sink (blue carbon) of Limassol. It is estimated that on average the annual carbon sequestration rate is between 278 t C ha^{-1} yr^{-1} and 1020.3 tCO_2 ha^{-1} yr^{-1}. This means that C sequestration by a 141.2 ha seagrass meadow can potentially cover the (20%) emissions gap, which highlights the great potential this ecosystem has to support the goals of the NZC mission. However, there is high uncertainty in this estimation and the AP foresees a separate action (CA_5: Seagrass meadows in Limassol-carbon sinking and meadow restoration) for seagrass meadows, which capitalizes on current and previous work on seagrass meadows mapping and conservation in Cyprus. Additionally, there are many co-benefits in the AP actions/activities/projects that are related to minimizing coastal and marine pollution which will in turn support seagrass conservation. For instance, improving green spaces (BA_3: Urban regeneration) favours control of water flow in the city, as water is captured in green spaces and infiltrates into the soil where pollutants (e.g., heavy metals, nutrients, persistent organic pollutants, pharmaceuticals) are contained (reducing runoff to the sea). In this way, marine pollution is controlled by "green buffer zones". Additionally, actions related to the port and marina (CA_1: Cold Ironing in the Limassol Port ; CA_2: Limassol Marina energy community) also favour marine pollution mitigation. It should be stressed that seagrass meadows are essential for C storage in Limassol and Cyprus and their degradation and eventual loss will increase emissions and negatively affect biodiversity at the local and regional level.

C sequestration in green infrastructure

Carbon sequestration in Mediterranean green urban spaces can vary depending on several factors, including the types of plants and trees, their age, climate conditions, and maintenance practices. On average, mature trees in urban (temperate) areas can sequester carbon at a rate of about 45 tons C ha^{-1} (of canopy cover) yr^{-1} or 165.2 tons CO_2 ha^{-1} yr^{-1} (high uncertainty; this needs to be verified by monitoring). This estimate includes both aboveground and belowground carbon storage and it is approx. 5.5 times lower than that of seagrasses. Young trees sequester less carbon than mature ones. Proper maintenance and care of urban green spaces can also enhance their carbon sequestration potential. In Mediterranean climates, some species of trees and plants may be more efficient at sequestering carbon than others due to their adaptability to the local environment. Carbon is stored in existing green spaces of Lemesos, but the quantity is unknown, as well as in the organic matter of soil surfaces that have not yet been sealed. A rough estimation of canopy cover in the 350 (small) city parks is 6.2 ha, which leads to an estimated sequestration of 1020 tons of CO_2 /year. To cover the emissions gap from urban (matured) green spaces would require a canopy coverage equal to 872 ha (which is equal to increasing the current green spaces (canopy cover) x 140; practically impossible. The municipality has limited space for this, but the co-benefits of green infrastructure are key for sustainable city ecosystems and human health. Therefore, the AP (see Build Environment) foresees actions for enhancing green infrastructure (BA_3: Urban regeneration) at small and large scales. Some examples include the connection of green spaces and enhanced tree planting in the city (Limassol participates in a project involving planting 300,000 trees in the following couple of years) and the creation (and maintenance) of microforests, in all available (and new) city land. This will support microclimate improvement (e.g., CC adaptation) and storing C in the soil and plants (C sequestration).

Strategy for GHG emission gap

In addition to the above, the strategy for the GHG emissions gap (overall) follows the philosophy of the approach described in the introduction of the AP. The key elements of the strategy are:

1) **Vision**: Nature-based solutions tailored to Lemesos for GHG emissions mitigation, based on seagrass meadows and green urban spaces.
2) **Objectives**: Maintain and enhance C storage in the city ecosystems
3) **Actions**:
   - CA_5: Assessment of Carbon Sinking Potential of Seagrass Meadows in the Limassol Bay
   - BA_3: Urban regeneration (green spaces unification via green corridors + planting 300,000 trees)
4) **KPIs** (besides those provided for the above actions): C sequestration potential tons C ha^{-1} yr^{-1} in seagrass and green spaces.
5) **MEL**: Monitoring, Evaluation, Learning (involvement of stakeholders; Lemesos Commons)
6) **Communication plan**: Nature-Based Solutions will be a vehicle for disseminating the work related to the NZC mission and a unique Living Lab (seagrass) among the 100 cities of the mission. The actions have high replicability potential in coastal (and insural) Mediterranean areas.
7) **Integration with other actions:** (especially coastal and marine; build environment; waste thematics).
8) **Continuous improvement**: Based on MEL and stakeholder engagement (and based on the CCC APs).
9) **Financial/Funding**: Due to innovation and scientific novelty there is great potential to attract funding from EU schemes (e.g., Horizon, Prima, LIFE) and RIF (e.g., Integrated / Infrastructure projects). These actions could also linked to emerging C markets (C credits and shipping; corporate social responsibility etc.).
10) **Timeline and milestones (indicative)** (2023-2030) (see Figure).

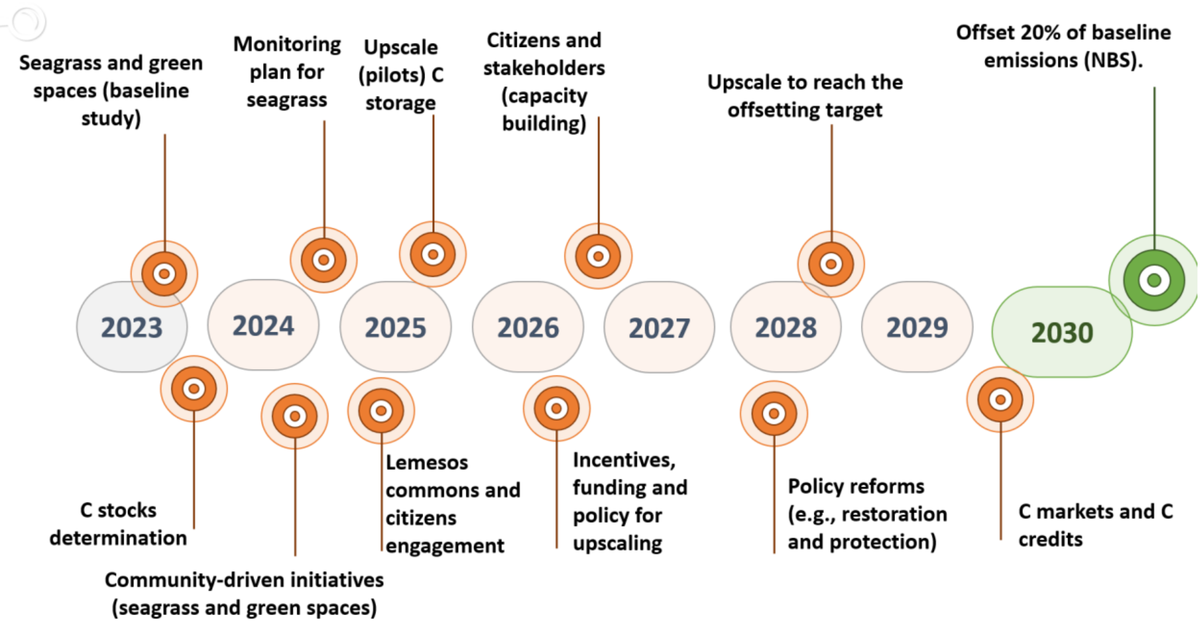


Figure 39. Indicative timeline and milestones of the strategy for residual emissions

4.3 Module B-3 Indicators for Monitoring, Evaluation and Learning

Module B-3 "Indicators for Monitoring, Evaluation and Learning" should contain a selection of indicators taken from the Comprehensive Indicator Sets developed by NZC. The following should be provided: An overview table listing the indicators selected per outcome and impact including targets and evaluation points (B-3.1); and a metadata table for each indicator selected, as specified in the Comprehensive Indicator Sets (B-3.2).

B-3.1.: Impact Pathways

Outcomes/ impacts addressed	Action/ project	Indicator No.	Indicator name		Target values		
					2025	2027	2030

Early: N/A **Late**: N/A Switch to NG and the interconnector (mainly) gives more room to RES (esp. PV). **Impact**: Deeper RES penetration	1. Change of electricity mix 6. Centralised storage and generation	E.1	Grid emissions factor (tCO2eq/MWh)		0.500	0.400	0.285
Early: Lowering electricity bills **Late**: Increase in energy system resilience **Impact**: Lower cost for consumers; Reduced GHG emissions	1. Change of electricity mix 2. Energy community 4. RES with storage 5. Deep renovation 6. New carbon-neutral buildings 7. Urban regeneration	E.2	Local renewable energy production (% in MWh)		10%	20%	40%
Early: Fewer households using biomass for heating **Late**:. N/A **Impact**: Much Lower levels of air pollution in Limassol	1. Change of electricity mix 2. Energy community 4. RES with storage 6. Centralised storage and generation	E.3	Aerosol pollutant concentrations (PM10)		1% reduction	5% reduction	15% reduction
Early: participation in decision instruments **Late**: Fully-fledged involvement in energy prosumerism **Impact**: Sense of ownership and responsibility for energy production means Improved access to information, awareness & behaviour change	2. Energy community 4. RES with storage 5. Heat Pumps in new and existing buildings 6. Deep renovation 7. Urban regeneration	E.4	Active engagement of citizens in co-creation/co-design decision-making (%)		5% engagement (via short survey)	25% engagement (via short survey)	80% engagement (via short survey)
Early: Familiarisation with open data for citizens **Late**: Adoption of open data sets principles (openness,	2. Energy community 4. RES with storage 5. Heat Pumps in new and existing buildings	E.5	Open data sets (#)		1 (nr of sets)	3	5

accountability, democratisation etc.) **Impact**: Owing and sharing data generated							
Early: New skills adoption (installers, planners, engineers) **Late**: New skills for threatened professions **Impacts**: New technical and scientific skills for Limassol workforce, increased employment	1. Change of electricity mix 2. Energy community 3. Fresnel systems for industry 4. RES with storage 5. Heat Pumps in new and existing buildings 6. Deep renovation 7. New carbon-neutral buildings 8. Urban regeneration	E.6	Green jobs		100 new green jobs	200 new green jobs	1000 new green jobs
Early: New skills adoption (installers, planners, engineers) **Late**: Equipped personnel for the Limassol energy transition **Impacts**: New technical and scientific skills for Limassol workforce, increased employment	1. Change of electricity mix 2. Energy community 3. Fresnel systems for industry 4. RES with storage 5. Heat Pumps in new and existing buildings 6. Deep renovation 7. New carbon-neutral buildings 8. Urban regeneration	E.7	Youth unemployment rate (<30 yr) (% of people)		Unemployment rate amongst youth (<30yr): 15%	14%	12%
Early: Communication of vision **Late**: Stakeholders fully engaged **Impacts**: Deep diffusion of CCI vision to Limassol stakeholders	2. Energy community 3. Fresnel systems for industry 4. RES with storage 5. Heat Pumps in new and existing buildings	E.8	Signatories to CCI plan (number of signatures in SMEs, large corporations and local/national authorities)		3	10	30
- Reduced GHG emissions	- Deep renovation - New carbon-neutral buildings	GHG1	GHG emission from stationary energy		20%	60%	100%
- Reduced GHG emissions	- Deep renovation - New carbon-neutral buildings	GHG2	Rate of retrofit		1.3%	2%	3.5%

- Reduced GHG emissions - Reduced energy demand, needs, or consumption	- Deep renovation - New carbon-neutral build-ings	GHG3	Energy use by fuel/energy type within city boundary		15%	30%	60%
- Improved air quality	- Deep renovation - New carbon-neutral buildings - Urban regeneration	PHE1	PM2.5 concentration levels		-5%	-30%	-50%
- Improved air quality	- Deep renovation - New carbon-neutral buildings - Urban regeneration	PHE2	PM10 concentration levels		-3%	-10%	-20%
- Reduced heat island effect - Increased resilience to climate change	- Deep renovation - New carbon-neutral buildings - Urban regeneration	PHE3	Urban Heat Island (UHI) Effect		-0.3 ºC	-0.7	-1.5 ºC
- Reduced heat island effect - Increased resilience to climate change	- Deep renovation - New carbon-neutral buildings - Urban regeneration	PHE4	Mean value of daily maximum temperature (TXX)		-1 ºC	-2 ºC	- 4 ºC
- Reduced heat island effect - Increased resilience to climate change	- Deep renovation - New carbon-neutral build-ings - Urban regeneration	PHE5	Mean value of daily minimum temperature (TNN)		-0.5 ºC	-0.7 ºC	-1 ºC
- Reduced heat island effect - Increased resilience to climate change	- Deep renovation - New carbon-neutral build-ings - Urban regeneration	PHE6	Heatwave (HW) incidence		3	2	2
- Enhanced physical and mental well-being, comfort and productivity	- Deep renovation - New carbon-neutral buildings - Urban regeneration	PHE7	Wellbeing of citizens (questionnaire)		Satisfaction +10% with respect to baseline	Satisfaction +20% with respect to baseline	Satisfaction +30% with respect to baseline
- Enhanced liveability attractiveness/ aesthetics	- Urban regeneration	PHE8	Green spaces		Improvement +2% with respect to baseline	Improvement +30% with respect to baseline	Improvement +50% with respect to baseline
GHG reductions Enhanced livability	1.Implementation of public transportation strategies	TR1	Modal split of public transportation		6%	12%	20%
GHG reductions Enhanced livability	2.Strategies enhancing micro-mobility modal split	TR2	Modal split of micro-mobiltiy		3%	6%	10%
GHG reductions Enhanced livability	3.Development of comprehensive pedestrian network	TR3	Modal split of pedestrians		1.5%	3%	5%
GHG reductions Enhanced livability	4.Establishment of vehicle electrification strategies	TR4	Market share of electric vehicles		14%	28%	47%
GHG reductions Enhanced livability	4.Establishment of vehicle electrification strategies	TR5	Market share of electric buses		30%	60%	100%
GHG reductions Enhanced livability	5.Strategies imrpoving the efficiency of freight transportation	TR6	Reduction of freight transportation ton-kms		3%	6%	10%

Enhanced physical and mental well-being, comfort and productivity	All transport actions - Deep renovation - New carbon-neutral buildings - Urban regeneration	TR7	Wellbeing of citizens (questionnaire)		Satisfaction +10% with respect to baseline	Satisfaction +20% with respect to baseline	Satisfaction +30% with respect to baseline
(list early changes/ late outcomes and impacts to be evaluated by indicator)	(list action/ pilot project if applicable)	(indicate unique identifier)	(Insert indicator name)		(list one value per indicator)	(list one value per indicator)	(list one value per indicator)
Early changes: Remove 30% of organic waste for separate treatment **Late changes**: remove 90% of organic wastes to zero GHG emissions due to landfill.	Waste segregation (in house/in bussiness) to remove organic waste for energy and fertilizer production	CE1	(Organic Waste) % of organic waste (mass) in Lemesos municipality, separately collected (household/company segregation)		30%	70%	90%
Early changes: Remove 30% of organic waste for separate treatment **Late changes**: remove 90% of organic wastes to zero GHG emissions due to landfill. GHG reductions Enhanced livability	Waste segregation (in house/in bussiness) to remove organic waste for energy and fertilizer production All transport actions	CE2	GHG emissions reduction (tCO2)		-20%	-50%	-80%
Early changes: enhance waste segregation at the shource. **Late changes**: Implement “pay as you throw” approach in Lemesos municipality.	Zero waste production (circular economy) in Lemesos	CE3	Percentage of the recyclable material diverted from the landfill		25%	50%	75%

B-3.2: Indicator Metadata	
Type of indicator: GHG Emissions (direct impacts)	
Indicator Grid emissions factor E.1	
Indicator Name	Grid emissions factor
Indicator Unit	tCO_2/MWh
Definition	The emissions factor of grid-generated electricity (on a national scale)
Calculation	(calculations done in a modelling suite for Cyprus’ NECP)

Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Built Environment Public Lighting Transport IPPU AFOLU
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	*Impact Pathways according to Module B-1* Energy Systems Green infrastructure Built environment Mobility & transport Waste & Green circular economy Smart & Digital Solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	Relevant ministries (esp. MECI)
Expected availability	In yearly intervals (but delayed by 1-2 years)
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator GHG emissions from stationary energy GHG1	
Indicator Name	GHG emission from stationary energy
Indicator Unit	tonCO_2-e
Definition	Measurement and quantification of greenhouse gas (GHG) emissions specifically attributed to the use of energy from stationary sources. Stationary energy sources typically include power plants, industrial facilities, residential and commercial buildings, and other fixed installations. This indicator focuses on emissions resulting from the combustion of fossil fuels or the use of non-renewable energy sources, such as coal, natural gas, and oil, to generate electricity, heat, or steam. It provides insight into the amount of greenhouse gases, such as carbon dioxide (CO2), methane (CH4),

	and nitrous oxide (N2O), released into the atmosphere due to energy-related activities, highlighting the environmental impact of stationary energy use on climate change.
Calculation	1. Collect Energy Consumption Data: Gather data on energy consumption from various stationary sources. This may include electricity consumption data, fuel consumption records, and any other relevant energy data. 2. Determine Emission Factors: Emission factors represent the amount of GHGs emitted per unit of energy consumed for different energy sources. These factors are usually provided by government agencies, energy providers, or environmental organizations. 3. Calculate Emissions for Each Source: Multiply the energy consumption of each stationary source by the corresponding emission factor to calculate the GHG emissions for that source. Repeat this calculation for all energy sources. 4. Sum Up Emissions: Add up the calculated GHG emissions from all stationary energy sources to get the total emissions.
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes - Reduced GHG emissions
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
If yes, which co-benefit does it measure?	Co-Benefits
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration - Construction of New Carbon-Neutral Buildings
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Municipality, CEIC, Cyprus Energy Agency
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator GHG emissions reduction CE2	
Indicator Name	GHG emissions reduction

Indicator Unit	tCO_2
Definition	GHG emission reductions for relevant sectors
Calculation	Direct measurement AND using emission factors related to organic waste (CE1) landfilling (literature and measurements)
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport, Waste/Circular economy
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	TR1 : Relevant ministries CE2 : Based in CE1 indicator and emissions factors from the literature. Field measurements in Cypriot landfills that contain organic waste.
Expected availability	For Limassol Municipality
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	CE1: Sustainable Solid Waste management.
Type of indicator: Renewable Energy Production and Energy Use	
Indicator local renewable energy production E.2	
Indicator Name	Local renewable energy production
Indicator Unit	% of final energy demand (in MWh) from local RES
Definition	The % of local energy demand covered by local RES production
Calculation	Measurement of final demand compared to the total
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes, via contributions to energy emissions factor]
If yes, which emission source sectors does it impact? (table A-1)	Built Environment IPPU
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]

If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	*Impact Pathways according Module B-1* Energy Systems Green infrastructure Built environment Smart & Digital solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	CCI digital platform; CERA; Municipality
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	% of final energy demand (in MWh) from local RES
Other indicator systems using this indicator	The % of local energy demand covered by local RES production
Indicator Energy use by fuel/energy type within city boundary GHG3	
Indicator Name	Energy use by fuel/energy type within city boundary
Indicator Unit	MWh/year
Definition	It refers to the estimation of the various sources of energy consumed within the defined geographical limits of a city. This includes the identification and quantification of energy usage from different fuel types, such as electricity, heating diesel kerosene, LPG, natural gas, coal, biomass, and renewable sources like solar, wind, and geothermal energy.
Calculation	1) Data Collection: Gather data on energy consumption within the city boundary from relevant sources, such as utility companies, energy providers, government agencies, and energy surveys. electricity, heating diesel kerosene, LPG, natural gas, coal, biomass, and renewable sources like solar, wind, and geothermal energy used within the city. 2) Convert Units: Ensure that all energy consumption data is in a consistent unit of measurement, such as kilowatt-hours (kWh) for electricity, cubic meters for natural gas, liters for heating diesel, diesel, gasoline. 3) Identify Fuel Types: Categorize the energy data based on different fuel types, such as electricity, heating diesel kerosene, LPG, natural gas, coal, biomass, and renewable sources like solar, wind, and geothermal energy.

	4) Calculate Energy Use: For each fuel type, sum up the energy consumption values for all relevant sources. For example, add up the electricity consumption from residential, primary, secondary, tertiary sectors, public lighting and transport to calculate total electricity use. 5) Analyze and Interpret Data: Analyze the calculated energy use by fuel type to understand the energy consumption patterns within the city. Identify trends, variations, and potential areas for energy efficiency improvements or the adoption of renewable energy sources. 6) Carbon Emission Estimation: If desired, you can estimate the carbon emissions associated with each fuel type using appropriate emission factors for each source.
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes - Reduced energy demand, needs, or consumption
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
If yes, which co-benefit does it measure?	Co-Benefits
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration - Construction of New Carbon-Neutral Buildings
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Municipality, CEIC, Cyprus Energy Agency
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Type of indicator Air pollution	
Indicator Aerosol pollutant concentrations E.3	
Indicator Name	Aerosol pollutant concentrations
Indicator Unit	Particle concentration
Definition	Concentration of particles in the Limassol atmosphere
Calculation	Periodic measurement campaigns of aerosol particles
Indicator Context	

Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	no
If yes, which emission source sectors does it impact? (table A-1)	Transportation
Does the indicator measure indirect impacts (i.e. co- benefits)?	[Yes]
If yes, which co-benefit does it measure?	Health
Can the indicator be used for monitoring impact pathways?	[no]
If yes, which NZC impact pathway is it relevant for?	*N/A*
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	DLI; Universities/ Research Inst.
Expected availability	Yearly
Suggested collection interval	Seasonal (every three months)
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Aerosol pollutant concentrations
Indicator PM2.5 concentration levels PHE1	
Indicator Name	PM2.5 concentration levels
Indicator Unit	µg/ m3 OR # of days above threashold
Definition	PM concentration levels refer to the measurement of particulate matter in the air, specifically the concentration of particles suspended in the atmosphere. These particles can vary in size, composition, and origin, and they are categorized based on their diameter. PM concentration levels are typically expressed in micrograms per cubic meter (µg/m³) and are used to assess air quality and potential health risks associated with exposure to airborne particulates. PM2.5: Particulate matter with a diameter of 2.5 micrometers or smaller. These fine particles are capable of penetrating deep into the respiratory system and can have adverse health effects when inhaled. Sources of PM2.5 include combustion processes (e.g., vehicle emissions, industrial activities), dust, and chemical reactions in the atmosphere.
Calculation	Air quality monitoring stations measure and report PM2.5 concentration levels 1. Air Sample Collection: Air samples are collected using specialized equipment, such as high-volume samplers or low-volume samplers with size-selective inlets designed to collect particles with diameters less than or equal to 2.5 micrometers. These samplers draw in air over a specified period.

	2. Filter Collection: A filter (usually made of quartz or other suitable material) is used to capture the particulate matter present in the sampled air. The filter collects particles as the air passes through it. 3. Weighing the Filter: After the sampling period, the filter is carefully removed and weighed. This weight measurement includes both the mass of the filter itself and the mass of the collected particles. 4. Correction for Filter Blank: To get an accurate measurement of the particle mass, the weight of the blank filter (a clean, unused filter) is subtracted from the weight of the filter with collected particles. This correction accounts for any contamination or residue that may be present on the blank filter. 5. Calculation of PM2.5 Concentration: The PM2.5 concentration (in micrograms per cubic meter, μg/m³) is calculated using the following formula PM2.5 (μg/m3) = ((Weight of Filter with Collected Particles − Weight of Blank Filter) x 1,000,000\right)/ (Volume of Air Sample (cubicmeters))
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it impact?	Built environment Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	- Improved air quality
Can the indicator be used for monitoring impact pathways?	No
If yes, which NZC impact pathway is it relevant for?	Impact Pathways according to Module B-1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	DLI; Universities/ Research Inst.
Expected availability	Yearly
Suggested collection interval	Seasonal (every three months)
References	
Deliverables describing the indicator	NA
Other indicator systems using this indicator	NA
Indicator PM10 concentration levels PHE2	
Indicator Name	PM10 concentration levels

Indicator Unit	µg/ m3 OR # of days above threashold
Definition	Air quality monitoring stations measure and report PM10 concentration levels 1. Air Sample Collection: Air samples are collected using specialized equipment, such as high-volume samplers or low-volume samplers with size-selective inlets designed to collect particles with diameters less than or equal to 10 micrometers. These samplers draw in air over a specified period. 2. Filter Collection: A filter (usually made of quartz or other suitable material) is used to capture the particulate matter present in the sampled air. The filter collects particles as the air passes through it. 3. Weighing the Filter: After the sampling period, the filter is carefully removed and weighed. This weight measurement includes both the mass of the filter itself and the mass of the collected particles. 4. Correction for Filter Blank: To get an accurate measurement of the particle mass, the weight of the blank filter (a clean, unused filter) is subtracted from the weight of the filter with collected particles. This correction accounts for any contamination or residue that may be present on the blank filter. 5. Calculation of PM10 Concentration: The PM10 concentration (in micrograms per cubic meter, µg/m³) is calculated using the following formula PM10 (µg/m3) = ((Weight of Filter with Collected Particles − Weight of Blank Filter) x 1,000,000\right)/ (Volume of Air Sample (cubicmeters))
Calculation	Air quality monitoring stations measure and report PM10 concentration levels 1. Air Sample Collection: Air samples are collected using specialized equipment, such as high-volume samplers or low-volume samplers with size-selective inlets designed to collect particles with diameters less than or equal to 10 micrometers. These samplers draw in air over a specified period. 2. Filter Collection: A filter (usually made of quartz or other suitable material) is used to capture the particulate matter present in the sampled air. The filter collects particles as the air passes through it. 3. Weighing the Filter: After the sampling period, the filter is carefully removed and weighed. This weight measurement includes both the mass of the filter itself and the mass of the collected particles.

	4. Correction for Filter Blank: To get an accurate measurement of the particle mass, the weight of the blank filter (a clean, unused filter) is subtracted from the weight of the filter with collected particles. This correction accounts for any contamination or residue that may be present on the blank filter. 5. Calculation of PM10 Concentration: The PM10 concentration (in micrograms per cubic meter, μg/m³) is calculated using the following formula PM10 (μg/m3) = ((Weight of Filter with Collected Particles − Weight of Blank Filter) x 1,000,000\right)/ (Volume of Air Sample (cubicmeters))
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it impact?	Built environment Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	- Improved air quality
Can the indicator be used for monitoring impact pathways?	No
If yes, which NZC impact pathway is it relevant for?	Impact Pathways according to - according to Module B-1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	DLI; Universities/ Research Inst.
Expected availability	Yearly
Suggested collection interval	Seasonal (every three months)
References	
Deliverables describing the indicator	NA
Other indicator systems using this indicator	NA
Type of Indicator: Relevant Technical Parameters	
Indicator Rate of Retrofit GHG2	
Indicator Name	Rate of retrofit
Indicator Unit	% per year
Definition	Rate of retrofit refers to the speed or pace at which existing buildings undergo renovation and energy efficiency improvements. It is a measure of the frequency and scale of retrofits implemented in a given timeframe. A higher rate of retrofit indicates a more proactive and accelerated approach to upgrading buildings, leading to

	reduced energy consumption, lower greenhouse gas emissions, and improved overall sustainability in the built environment.
Calculation	Rate of Retrofit = (Number of Retrofitted Buildings / Total Number of Buildings) * 100
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes - Increased rate of retrofit
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
If yes, which co-benefit does it measure?	NA
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Ministry of interior / Department of lands and surveys offices
Expected availability	Yearly
Suggested collection interval	Trimestral
References	
Deliverables describing the indicator	NA
Other indicator systems using this indicator	NA
Indicator Modal split of public transportation TR1	
Indicator Name	Modal split of public transportation
Indicator Unit	%
Definition	The percentage of people using public transportation for their trips within Limassol Municipality
Calculation	Revealed preference surveys ; Origin-Destination surveys
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	Ministry of Transport, Communications and Works ; public transportation providers
Expected availability	For Limassol Municipality
Suggested collection interval	Every 2 years
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator Modal split of micro-mobility services TR2	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	Modal split of micro-mobility services
Indicator Unit	%
Definition	The percentage of people using micro-mobility services for their trips within Limassol Municipality
Calculation	Revealed preference surveys ; Origin-Destination surveys
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	Ministry of Transport, Communications and Works ; shared micro-mobility providers
Expected availability	For Limassol Municipality
Suggested collection interval	Every 2 years
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator Modal split of pedestrians TR3	
Indicator Name	Modal split of pedestrians

Indicator Unit	%
Definition	The percentage of people walking for their trips within Limassol Municipality
Calculation	Revealed preference surveys ; Origin-Destination surveys
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	Ministry of Transport, Communications and Works
Expected availability	For Limassol Municipality
Suggested collection interval	Every 2 years
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator Market share of electric vehicles TR4	
Indicator Name	Market share of electric vehicles
Indicator Unit	%
Definition	The percentage of private vehicles that are converted to electric within Limassol Municipality
Calculation	Private vehicle dealers; vehicle registrations ; statistics by Road Transport Department (within Ministry of Transport, Communications and Works)
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]

If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	Ministry of Transport, Communications and Works
Expected availability	For Limassol Municipality
Suggested collection interval	Annual basis
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator Market share of electric buses TR5	
Indicator Name	Market share of electric buses
Indicator Unit	%
Definition	The percentage of buses that are converted to electric within Limassol Municipality
Calculation	statistics by Ministry of Transport, Communications and Works and public transportation operators
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	Ministry of Transport, Communications and Works, Public transportation operators
Expected availability	For Limassol Municipality
Suggested collection interval	Annual basis
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A

Indicator Reduction of freight transportation ton-kms TR6	
Indicator Name	Reduction of freight transportation ton-kms
Indicator Unit	%
Definition	The reduction of freight transportation ton-kilometers
Calculation	Origin-destination surveys ; logs by freight and cargo operators,
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	Ministry of Transport Communications and Works; Ministry of Commerce ; freight and cargo operators
Expected availability	For Limassol Municipality
Suggested collection interval	Every 2 years
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator Organic Waste CE1	
Indicator Name	Organic waste
Indicator Unit	Percentage (%)
Definition	% of organic waste (mass) in Lemesos municipality, separately collected (household/company segregation)
Calculation	Weight measurement of the organic waste fraction diverted from landfilling
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it impact?	Fields of action according to GHG inventory format – Module A-1
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	NA

Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	Monitoring of the municipal solid waste collection and treatment processes.
Expected availability	Yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Sustainable Solid Waste management.
Indicator recycling efficiency CE3	
Indicator Name	Recycling efficiency
Indicator Unit	Percentage (%)
Definition	Percentage of the recyclable material diverted from the landfill
Calculation	Weight measurement of the organic waste fraction diverted from landfilling
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[No]
If yes, which emission source sectors does it impact?	NA
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	NA
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	Monitoring of the municipal solid waste collection and treatment processes
Expected availability	Yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Sustainable Solid Waste management.
Type of indicator: Modifications in temperature	
Indicator Urban Heat Island (UHI) Effect PHE3	

Indicator Name	Urban Heat Island (UHI) Effect
Indicator Unit	°C UHImax
Definition	Magnitude of the UHI measured in ºC
Calculation	1) Data Collection: Obtain temperature data for both the urban area and the nearby rural area. Ideally, the data should cover the same time period, such as a day or a month, to ensure accurate comparisons. 2) Choose Representative Locations: Select representative weather stations or measurement points within both the urban and rural areas. Ensure that the locations are relatively homogeneous and free from significant local influences. 3) Calculate Temperature Difference: Subtract the average temperature of the rural area from the average temperature of the urban area to calculate the temperature difference. *Urban Heat Island Magnitude = Average Urban Temperature - Average Rural Temperature* To express the urban heat island magnitude as a percentage, divide the temperature difference by the average rural temperature and multiply by 100. *Urban Heat Island Magnitude (%) = (Temperature Difference / Average Rural Temperature) * 100*
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	- Reduced heat island effect
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Department of Meteorology; Research Institutes
Expected availability	Monthly
Suggested collection interval	Weekly
References	
Deliverables describing the indicator	NA

Other indicator systems using this indicator	NA
Indicator Mean value of daily maximum temperature (TXX) PHE4	
Indicator Name	Mean value of daily maximum temperature (TXX)
Indicator Unit	˚ C TXX
Definition	The mean value of the daily maximum temperature (TXX) refers to the average temperature recorded during a specific time period (usually a day) at a particular location. The daily maximum temperature represents the highest temperature reached on a given day.
Calculation	1) Data Collection: Obtain a dataset containing daily maximum temperature records for the chosen location and time period. The dataset should include the daily maximum temperature values for each day in the selected period. 2) Summation: Add up all the daily maximum temperature values to get the total sum of temperatures for the period. 3) Count Days: Count the number of days in the selected time period. This will give you the total number of days for which temperature data is available. 4) Calculate Mean: Divide the total sum of temperatures by the number of days in the period to obtain the mean value of the daily maximum temperature (TXX). *TXX = (Sum of Daily Maximum Temperatures) / (Number of Days)*
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	- Reduced heat island effect
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Department of Meteorology; Research Institutes
Expected availability	Monthly
Suggested collection interval	Weekly
References	
Deliverables describing the indicator	NA
Other indicator systems using this indicator	NA

Indicator Mean value of daily minimum temperature (TNN) PHE5	
Indicator Name	Mean value of daily minimum temperature (TNN)
Indicator Unit	˚C TNN
Definition	The mean value of the daily minimum temperature (TNN) refers to the average temperature recorded during a specific time period (usually a day) at a particular location, considering the lowest temperature reached on each day.
Calculation	1) Data Collection: Obtain a dataset containing daily minimum temperature records for the chosen location and time period. The dataset should include the daily minimum temperature values for each day in the selected period. 2) Summation: Add up all the daily minimum temperature values to get the total sum of temperatures for the period. 3) Count Days: Count the number of days in the selected time period. This will give you the total number of days for which temperature data is available. 4) Calculate Mean: Divide the total sum of temperatures by the number of days in the period to obtain the mean value of the daily minimum temperature (TNN). *TNN = (Sum of Daily Minimum Temperatures) / (Number of Days)*
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Reduced heat island effect
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Department of Meteorology; Research Institutes
Expected availability	Monthly
Suggested collection interval	Weekly
References	
Deliverables describing the indicator	NA
Other indicator systems using this indicator	NA
Indicator Heatwave (HW) incidence PHE6	
Indicator Name	Heatwave (HW) incidence

Indicator Unit	# of HW in summer
Definition	HW incidence is an indicator that measures the frequency of heatwaves in a specific region over a given period.
Calculation	Is the number of HW occurring during a summer
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	- Reduced heat island effect
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Department of Meteorology; Research Institutes
Expected availability	Monthly
Suggested collection interval	Weekly
References	
Deliverables describing the indicator	NA
Other indicator systems using this indicator	NA
Type of Indicator Citizen Engagement/Participation/Learning and Wellbeing	
Indicator Active engagement of citizens in decision-making E.4	
Indicator Name	Active engagement of citizens in decision-making
Indicator Unit	% of engaged citizens
Definition	The % of citizens in active engagement in matters of energy production and consumption
Calculation	Short survey (online)
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it impact? (table A-1)	N/A
Does the indicator measure indirect impacts (i.e. co- benefits)?	[Yes]
If yes, which co-benefit does it measure?	Democratisation of production means
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	*Impact Pathways according to Module B-1*

	Energy Systems Built Environment
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	Surveys (probably organised by municipality)
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Active engagement of citizens in decision-making
Indicator Open Data Sets E.5	
Indicator Name	Open data sets
Indicator Unit	Nr of open data sets
Definition	Data sets generated that are open access
Calculation	Counting the sets
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it impact? (table A-1)	N/A
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	*Impact Pathways according to Module B-1* Smart & Digital solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	Municipality; Digital service of CCI
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Open data sets
Indicator Well-being of citizens (questionnaire) TR7	
Indicator Name	Well-being of citizens

Indicator Unit	% increase or decrease
Definition	The percentage increase or decrease captured in the form of Likert scale of a revealed and stated preference survey inquiring about the well-being of citizens
Calculation	Statistical analysis of revealed and stated preference survey aiming to capture the satisfaction and the well-being of citizens
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes]
If yes, which emission source sectors does it impact?	Transport Built Environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	[no]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[yes]
If yes, which NZC impact pathway is it relevant for?	Technology & Infrastructure, Governance/Policy, Democracy/Participation, Social Innovation, Learning capabilities, Deep Energy Refurbishment of the Building Stock and Urban regeneration
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Unknown
Data requirements	
Expected data source	Limassol Municipality, living labs
Expected availability	For Limassol Municipality
Suggested collection interval	Annual basis
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	N/A
Indicator Green Spaces	
Indicator Name	Green spaces
Indicator Unit	Hectars/100.000
Definition	Open-space areas reserved for parks and other spaces", including plant life, water features and other kinds of natural environment such as roof or vertical gardens, meadows and woods. They mitigate impacts of climate change such as urban heat and flooding, while offering refuge to plant and animal species, boosting biodiversity. Urban green spaces are accessible to the public and improve citizens' wellbeing, providing mental and physical health benefits.

Calculation	Land cover dedicated to green spaces, obtained either through municipality records, land surveys or aerial images (or combinations), relative to the total surface area of the municipality.
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it impact?	Built environment
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	- Enhanced liveability attractiveness/ aesthetics - Increased urban forestry, plantation & improved plant heath - Improved land-use management practices (linked to biodiversity)
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	- Deep Energy Refurbishment of the Building Stock and Urban regeneration
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Ministry of interior / Department of Lands and Surveys Offices
Expected availability	Yearly
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	NA
Other indicator systems using this indicator	NA
Type of Indicator Economic Impacts	
Indicator Green Jobs E.6	
Indicator Name	Green jobs
Indicator Unit	Nr of open data sets
Definition	Nr of new jobs in sectors related to the transition (green jobs)
Calculation	From national employment statistics
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it impact? (table A-1)	N/A
Does the indicator measure indirect impacts (i.e. co- benefits)?	[Yes]
If yes, which co-benefit does it measure?	Employment
Can the indicator be used for monitoring impact pathways?	[No]
If yes, which NZC impact pathway is it relevant for?	*N/A*

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	National employment statistics; Employer's associations (OEB, CCCI) ; Municipality own data
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Green jobs
Indicator Youth Unemployment Rate E.7	
Indicator Name	Youth unemployment
Indicator Unit	% of employed persons <30 years
Definition	% of employed persons <30 years in green transition jobs
Calculation	New green jobs in young persons compared to youth unemployment
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it impact? (table A-1)	N/A
Does the indicator measure indirect impacts (i.e. co- benefits)?	[Yes]
If yes, which co-benefit does it measure?	Employment
Can the indicator be used for monitoring impact pathways?	[No]
If yes, which NZC impact pathway is it relevant for?	*N/A*
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	National employment statistics; Employer's associations (OEB, CCCI) ; Municipality own data
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Youth unemployment
Type of indicator: Policy	
Indicator Signatories to the CCC E.8	
Indicator Name	Signatories to CCC plan

Indicator Unit	Nr of signatories
Definition	Nr of organisations that have signed a declaration of association (or interest) with the Mission
Calculation	# of signatories
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it impact?	N/A
Does the indicator measure indirect impacts (i.e. co- benefits)?	[No]
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	[No]
If yes, which NZC impact pathway is it relevant for?	*N/A*
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no] Unknown
Data requirements	
Expected data source	Municipality own campaign
Expected availability	In yearly intervals
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	Green jobs

5 Part C – Enabling Climate Neutrality by 2030

Part C "Enabling Climate Neutrality by 2030" aims to outline any enabling interventions, i.e. with regard to organizational setting or collaborative governance models, or related to social innovations – designed to support and enable the climate action portfolios described in Module B-2 as well as aiming to achieve co-benefits outlined in the impact pathway (Module B-1).

5.1 Module C-1 Organisational and Governance Innovation Interventions

Module C-1 "Organisational and Governance Innovation Interventions" consists of a summary table, listing organizational and governance interventions and describing their impact (C-1.1) and a section for more detailed descriptions and comments (C-1.2).

C.1.1: Enabling organisational and governance interventions		
Intervention name	**NZ LEMESOS 2030 INC**	
Description	The “NZ LEMESOS 2030” organization is the executive branch of the Transition initially established by the Lemesos Municipality	
Responsible entity/ dept./ person	Lemesos Municipality Mayor, Nicos Nicolaides Lemesos Municipality City Council Stakeholders (e.g., ETEK, port authority, AHK) Businesses Citizens	
Involved stakeholder	NZ LEMESOS 2030 INC is a broad-base shareholder company with Lemesos Municipality and other authorities holding about 25% (none more than 10%), other institutional stakeholders about 20% (none more than 3%), individual business about 20% (none more than 2%) and individual citizens 35% (each up to .1%)	

Enabling impact (describe how intervention enables climate neutrality)	**Co-benefits** (indicate how intervention helps achieve impact listed in Module B-1)
NZ LEMESOS 2030 INC is founded to support overcoming barriers related to the NZ actions implementation. These barriers linked among others to bureaucracy (e.g., policies and legislation must change for the implementation of the deep retrofitting action) and the reduced capacity of the Municipality (e.g., specialized staff) to deal with many of the AP topics. The interdisciplinary composition (municipality, stakeholders, citizens) of the new organization highly supports just transition based on science and technology and sound execution (management). Briefly the responsibilities of the organization are:	The co-benefits related to the function of NZ Lemesos 2030 INC are: ✓ Decreases cost of implementation since no extra delays are faced. ✓ Signals participation of whole society. ✓ Undermines conspiracy theories About the Transition. ✓ Allows inclusion of non-climate aspects such as health. ✓ Translates the advisory role of co-workshops and the Lemesos Commons into executive power. ✓ Enhances professionals' expertise and citizen engagement.

1. Accelerates the full cycle of project execution 2. Ensures that since all views have been considered at planning stage, no major delays/obstacles will appear 3. Ensures cooperation by all stakeholders 4. Early discovering of barriers and opposition; dealing with opposition at planning stage; no decision back and forth 5. Creates strong social and therefore political support for otherwise controversial decisions. 6. Helps in correct sequencing/timing of projects 7. Facilitates attracting human and financial resources 8. Increases transparency, accountability and just transition as well as appearance of them. The transition to net zero involves numerous decisions, policies, and measures, which can face opposition and delays. The mission of the NZ LEMESOS 2030 INC is to accelerate inclusive, democratic, and sustainable change, from addressing needs to fostering citizenship. The process involves co-workshops, close cooperation with "Lemesos Commons" and extensive communication and education activities. Long-term impact aims to empower stakeholders, while medium-term outcomes include increased discussion of climate issues and professional advancement.	

Intervention name	**Lemesos Commons**
Description	Stakeholders and citizens engagement for co-design and co-implementation is key for achieving the objectives of the AP. The Lemesos Climate Transition plan involves active stakeholder and public engagement through the Lemesos Commons. Co-workshops gather homogeneous groups to address climate issues, aiming to change attitudes. The Commons, comprising

	diverse participants, harmonizes solutions and proposes projects. Civic engagement is pivotal, but challenges include inclusivity and sustaining involvement beyond interested parties. Briefly, around 20 experienced co-workshop participants (see introduction for a detailed description of the "Lemesos Commons and the Co-workshops), randomly selected from various stakeholder co-workshops, will form a heterogeneous stakeholder group, the Lemesos Commons, to review, harmonize, and integrate solutions developed from the homogeneous co-workshops. (Analyzing a problem first from one point of view by a homogeneous group and then from several points of view by a regrouped heterogeneous team is the well-known jigsaw method.) The reason for random selection is representativeness. Lemesos Commons members will commit their time for six months and then be replaced by other, also randomly selected, members from the same stakeholder group. (Each month 1/6th of Lemesos Commons members will be changed so that the change in membership is gradual.) The methodology for initial Lemesos Commons member preparation, physical sessions, synchronous and asynchronous online communication, progress monitoring, outcome evaluation, and transferring learning to the whole Transition arena is similar to those of the Co-workshops. An experienced member will act as the Lemesos Commons 'Speaker' for 6 months, representing the Commons to the Transition team, the City Council, and the broader society.	
Responsible entity/ dept./ person	Lemesos Municipality (Project LC^3)	
Involved stakeholder	Will be piloted through the Lc3 pilot project, so the project partners are the initial stakeholders: the Cyprus Institute, CUT, Friends of the Earth, ETEK.	
Enabling impact (describe how intervention enables climate neutrality)		**Co-benefits** (indicate how intervention helps achieve impact listed in Module B-1)
The outcome of the Lemesos Commons will be transition-advancing detailed project proposals that are well thought-out, consider multiple stakeholder concerns, are based on scientific expertise, can be socially monitored, have broad support and deal positively with objections. Its authority stems from its members' social recognition, their institutionalized participation in the governance/monitoring of Transition projects, participation in the City Transition team and the Lemesos NZC 2030 organization advisory board, but mainly it is their expert and referent		Multi-disciplinary social wisdom enters Transition Planning early in the process (before project execution starts). Random selection of members assists just transition.

authority that is important, so that although they have no formal veto power, their collective opinions will be respected.	Overseeing without executive authority helps accountability and transparency.
Co-workshops gather homogeneous groups to address climate issues, aiming to change attitudes. The Commons, comprising diverse participants, harmonizes solutions and proposes projects. Civic engagement is pivotal, but challenges include inclusivity and sustaining involvement beyond interested parties.	Membership does not require authority, status, economic or other privilege. Through the L. Commons people who have invested their time in co-workshops see that their opinions matter
From the participatory co-design solution workshops and the Lemesos Commons deliberations the details of three types of solutions will have emerged: (a) Energy efficiency improvements for buildings (b) RE generation for small and very small open spaces (c) Nature-based solutions for small and very small open spaces	Allows the de-politicalization of decisions and therefore acts as a continuation guarantee between transitions of political (partisan) power.

Intervention name	**Network of Mission Cities Cyprus**
Description	Building cooperative relationships, sharing, and applying best practices and expertise, and executing collaborative projects to advance both climate neutrality and digital transformation initiatives.
Responsible entity/ dept./ person (indicate responsible)	Limassol Municipality Mayor, Nicos Nicolaides Strovolos Municipality Mayor, Andreas Papacharalambous Pafos Municipality Mayor, Phedonas Phedonos Aradippou Municipality Mayor, Evaggelos Evaggelides

Involved stakeholder	Cyprus Central Government, Businesses, NGOs, Citizens

Enabling impact (describe how intervention enables climate neutrality)	**Co-benefits** (indicate how intervention helps achieve impact listed in Module B-1)
The establishment of the network supports: ✓ Scalability and transferability in both directions ✓ Stronger leverage towards central government ✓ Collective wisdom ✓ Non-partisanship allows activities to be assessed on their social, economic and climate merits.	The co-benefits related to the network are: ✓ Acceleration factor for the whole of Cyprus ✓ Applies pressure to central government for implementing climate promises. ✓ Diversifies the Mission ✓ Reduces 'jealousy' effect ✓ Increases "me too" effect

Intervention name	**Network Of Greek and Cyprus Mission Cities – Climanet**
Description	Prepares a proposal for: (a) the adoption of special procurement regulations for projects under the "100 Climate Neutral and Smart Cities by 2030" program, (b) the promotion of financial support guidelines for businesses, (c) the establishment of ESG standards for businesses in pilot cities, (d) communication of environmental action plan criteria aligned with the CCC, and (e) the creation of an ESG support office for SMEs in pilot cities.
Responsible entity/ dept./ person	Limassol Municipality Mayor, Nicos Nicolaides Municipality of Athens

	Municipality of Thessaloniki Deputy Mayor, Michail Koupkas Municipality of Ioannina Mayor, Dimitrios Papageorgiou Municipality of Kalamata Mayor, Athanasios Vasilopoulos Municipality of Kozani Mayor, Lazaros Maloutas Municipality of Trikala Mayor, Nikolaos Sakkas	
Involved stakeholder	Greek Central Government, Businesses, NGOs, Citizens	
Enabling impact (describe how intervention enables climate neutrality)		**Co-benefits** (Indicate how intervention helps achieve impact listed in Module B-1)
The network has the following enabling impacts: ✓ Knowledge, skill and good practice transfer among cities ✓ Scalability and transferability in both directions ✓ Stronger leverage towards central governments, the Mission and the EU ✓ Collective wisdom Non-partisanship allows activities to be assessed on their social, economic and climate merits Step towards 100 cities network		The following co-benefits are relevant to this intervention: ✓ Acceleration factor for the whole of Souther Europe and Eastern Med and Middle East region ✓ Applies pressure to central governments for implementing climate promises ✓ Diversifies the Mission ✓ Reduces 'jealousy' effect and Increases "me too" effect
Intervention name	**Network Of Mission Cities Whose Universities Are Part of The European University of Technology (EUT)**	

Description	Collaborate towards the development of a direct cultural, urban and scientific cooperation for the EU Mission: Climate Neutral and Smart Cities by 2030	
Responsible entity/ dept./ person	Municipality of Cluj-Napoca and Technical University of Cluj-Napoca Municipality of Dublin and Technological University Dublin Municipality of Riga and Riga Technical University Municipality of Sofia and Technical University of Sofia	
Involved stakeholder	Businesses, NGOs, Citizens, University Students	
Enabling impact (describe how intervention enables climate neutrality)		**Co-benefits** (indicate how intervention helps achieve impact listed in Module B-1)
The following enabling impacts are associated with the intervention: ✓ Facilitates Research, science, innovation and technology transfer among a diverse set ot NZC Mission cities ✓ Stronger leverage towards central governments, the Mission and the EU ✓ Collective wisdom ✓ Broader source for discussion of technological, social and financial solutions		Co-benefits ✓ Step beyond provincialism ✓ As this is a non-prescribed network (ie not based on geography, size or other obvious characteristic) it will provide unexpected idea transfer and combinations.
Intervention name	**Stakeholder Transition Arena**	
Description	The Arena, among others, creates strong cocial (and therefore political) support for controversial decisions and thus, helps in correct sequencing and timing of key projects and their upscaling (e.g., deep retrofiting, tram). In addition, the Arena could	

	accelerate attracting human and financial resources. Involves the scientific force (Thematic groups), the municipality (internal) transition team, MEL processes (from various projects/initiatives), the involvement of stakeholders and citizens who are essential towards the achieving of Transition aims and objectives (e.g., Entrepreneurs, high social status citizens, influencers).	
Responsible entity/ dept./ person	Municipality of Lemesos	
Involved stakeholder	The Municipality; NZ Lemesos 2030 Inc., stakeholders.	
Enabling impact (describe how intervention enables climate neutrality)		**Co-benefits** (indicate how intervention helps achieve impact listed in Module B-1)
Enabling impacts ✓ Deepens the inclusivity of considerations at the Trabnsition Planning stage ✓ Facilitates better updates of the CCC ✓ Ensures that since all views have been taken into account at planning stage, no major objections will appear later on ✓ Ensures cooperation by all stakeholders ✓ Helps involvement of more people and organizations ✓ Early discovering of barriers and opposition; dealing with opposition at planning stage; no decision back and forth ✓ 5. Creates strong social and therefore political support for otherwise controversial decisions. ✓ Helps in correct sequencing/timing of projects ✓ Facilitates attracting human and financial resources ✓ 8. Increases transparency, accountability and just transition as well as appearance of them.		Co-benefits ✓ Proposals to the L NZC 2030 Inc have already taken stakeholder views into account. ✓ Regulatory sandbox proposals have broad social support ✓ The 5 Transition Teams see that their views are taken into account

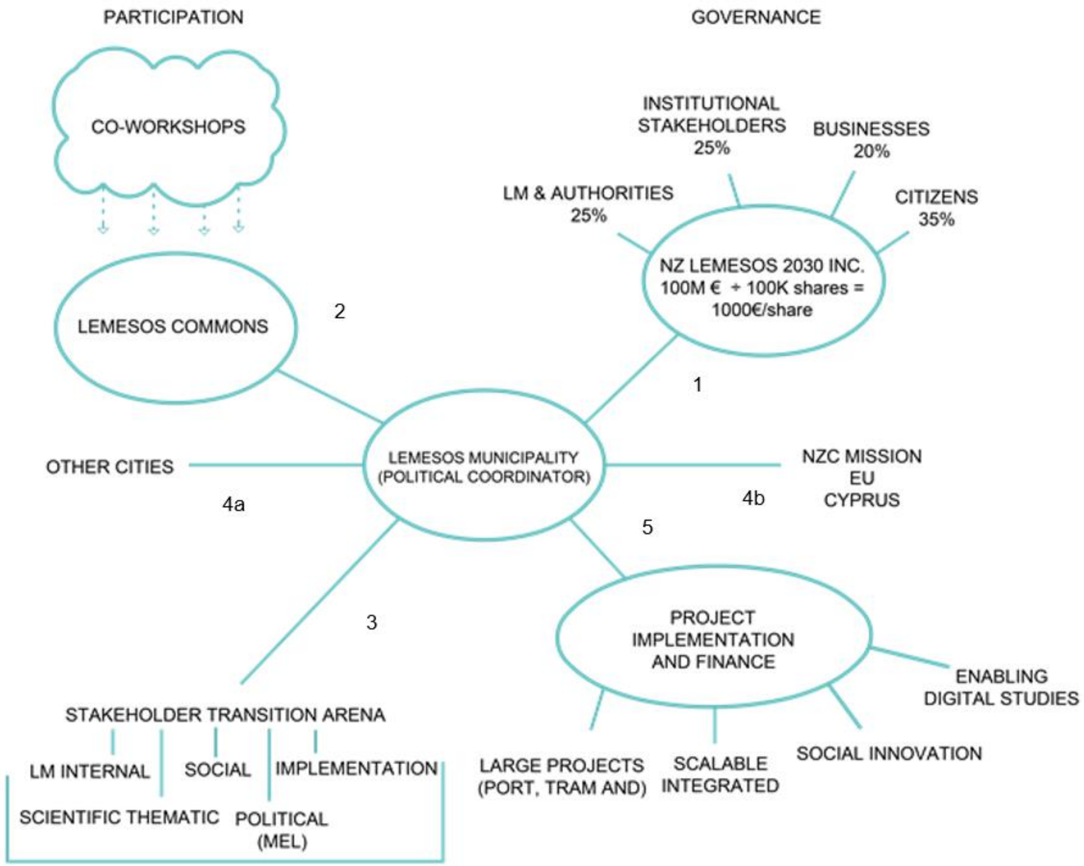
C.1.1.a: Enabling digital ('smart') interventions					
Intervention name	Description	Responsible entity/ dept./ person	Involved stakeholders	Enabling impact	Co-benefits
(indicate name of intervention)	(describe the substance of the intervention)	(indicate responsible)	(list all stakeholder involved and affected)	(describe how intervention enables climate neutrality)	(indicate how intervention helps achieve impact listed in Module B-1)
Urban Digital Platform	Integrated multi-purpose, inter-operable, scalable and secure urban digital platform on top of a smart infrastructure for the secure collection, storage and analysis of smart-city related big-data to be utilized by the municipality and government in planning, implementation and decision-making, (Decision support system) by the industry for leveraging smart and green innovation solutions, and by academia for new research opportunities, innovations and collaborations.	Limassol Municipality and "Lemesos NZC 2030" organization	Municipality, Governmental Organizations, Academia, Citizens, SMEs, Start-ups	Measurements to evaluate effectiveness of actions Modelling for future modifications of actions Creation of repository for reference Informed decision-making	Learning for stakeholders Citizen engagement Cost reduction/savings in resources used
Smart Apps & Intelligent Modules	Design and development of dedicated smart apps and digital solutions, to monitor and control specific activities, make data-based decisions and automate actions to optimize usage of energy, and predict needs. The smart apps are meant to extend the existing citizens app (Δημότης Λεμεσού) and allow users to enable them based on personal needs and preferences.	Limassol Municipality and "Lemesos NZC 2030" organization	Municipality, Governmental Organizations, Academia, Citizens, SMEs, Start-ups	Informed decision-making Measurements to evaluate effectiveness of actions Optimization of actions Prediction of future needs and adjustment of actions towards climate neutrality	Learning for stakeholders Citizen engagement Cost reduction/savings in resources used
Enhance the utilization of digital resources utilizing co-workshops	In order to take advantage of the full capacity of the digital resources to be developed by Limassol, these resources must reflect real-time situations, need to be user-friendly and consider the specific needs of various stakeholders, with different interests. For this purpose we plan to consult with stakeholders (government, municipality, citizens, experts,	Limassol Municipality and "Lemesos NZC 2030" organization	Municipality, Governmental Organizations, Non-governmental organizations, Academia, Citizens, SMEs, Start-ups	Tailor-made digital solutions to satisfy the needs of citizens and other stakeholders	Learning for stakeholders Citizen engagement

	academia, industry) to ensure just representation in the implementation of the Limassol digital solutions, as well as run targeted awareness campaigns, trainings and workshops to educate citizens, local enterprises and stakeholders about the benefits of the digitalization of Limassol. In order to expand the usage of the digital means designed, we plan to use incentives for the public (in the form of discounts/special offers), collaborations with academic institutions (to incorporate these digital tools to their curricula) and to provide support to local businesses, startups, and other organizations to develop innovative apps that leverage the platform existing digitalization capabilities.				
Emmisions monitoring system	Observation, Data gathering, validation and processing, modelling	CARE-C at CyI		Monitoring the main KPI of the Transition	
Digital Lemesos	Digital twin for decision support	STARC at CyI and “NZ Lemesos 2030 Inc. ” organization		Assisting in taking optimal decisions	
Lemesos NZC 2030 web portal	Comprehensive Public Interface to all digital services	““NZ Lemesos 2030 Inc.” organization		Communication with Citizens and Stakeholders	
Co-workshop, Lemesos Commons and MEL support systems	Social networking for the synchronous and asynchronous support, repository, and interaction of co-workshops, Lemesos Commons and Mission MEL	““NZ Lemesos 2030 Inc.” organization		Actively involving all Stakeholders and Citizens. Maintaining the ‘history’ of the Transition	

C-1.2: Description of organisation and governance interventions – textual and visual elements

(Please provide here any further detail on listed interventions)

For the Transition, and related to governance interventions, there are three fundamental aspects: 1) just transition for all, 2) projects and activities that are based on science and technology and 3) sound execution. For the NZC mission, the “NZ LEMESOS 2030” organization is founded, as the executive branch of the Transition, initially established by the Lemesos Municipality (see Figure above). The municipality (as the political coordinator) is at the centre (see Figure below) but there are some other fundamental elements: 1) the NZ Lemesos 2030 INC, 2) the Co-design participatory workshops (co-workshops) and the Lemesos Commons and 3) the (stakeholders) Transition Arena. These, capitalizing also in the interaction among Lemesos and Cypriot municipalities and other Mission cities (4a,b) facilitates the successful implementation of the Transition projects (5).

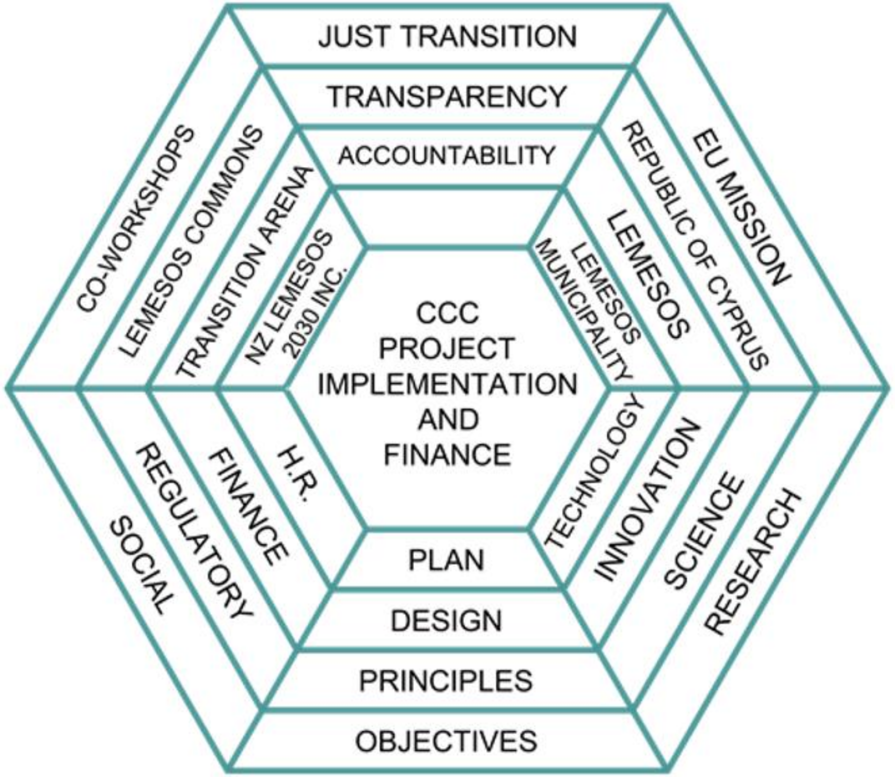


7) **NZ LEMESOS 2030.** INC is a broad-base shareholder company with Lemesos Municipality and other authorities holding about 25% (none more than 10%), other institutional stakeholders about 20% (none more than 3%), individual business about 20% (none more than 2%) and individual citizens 35% (each up to .1%). The organization accelerates projects execution (in comparison to the municipality current capacity). This is based on the fact that all views have been considered at the planning stage to avoid major obstacles. Barriers identification and dealing with opposition are key challenges towards the Transition. The organization increases transparency related to human and financial resources incorporation to the Transision. Equaly important, the organization guarantees that political changes (e.g., change of the Mayor; see the example in Seville) will not severely impact the AP towards Transition.
8) **The co-workshops and the Lemesos Commons.** Stakeholders and citizens engagement for co-design and co-implementation is fundamental. The Lemesos Climate Transition plan involves active stakeholder and public engagement through the Lemesos Commons. Co-workshops gather homogeneous groups to address climate issues, aiming to change attitudes. The Commons, comprising diverse participants, harmonizes solutions and proposes projects. The outcome of the Lemesos Commons will be transition-advancing detailed project proposals that are well thought-out, consider multiple stakeholder concerns, are based on scientific expertise, can be socially monitored, have broad support and deal positively with objections. These enable NZ LEMESOS 2030 to fulfill its role.
9) **The stakeholders Transition Arena** involves the scientific force (Thematic groups), the municipality (internal) transition team, MEL processes (from various projects/initiatives), the involvement of stakeholders and citizens who are essential towards the achieving of Transition aims and objectives (e.g., Entrepreneurs, high social status citizens, influencers). The Arena, among others, creates strong cocial (and therefore political) support for controversial decisions and thus, helps in correct sequencing and timing of key projects and their upscaling (e.g., deep retrofiting, tram). In addition, the Arena could accelerate attracting human and financial resources.

The difference between 2 and 3 is that the Lemesos Commons (2) is more inclusive (no one left behind principle) and the Arena (3) is more selective (e.g., key scientists, institutions, citizens are more than welcomed to achieve projects objectives towards Transition). Both are needed. As an example, an individual truck driver can, by her/his participation in co-workshop and L. Commons have her/his view considered. A transportation professor can, by his/her participation in the Scientific thematic transition Team and the stakeholder arena have his/her view considered. They are not mutually exclusive by definition, but they will attract different people statistically and different discussions will take place in each one. The municipality will add the political coordination and advance them to NZC Λ 2030, inc for execution. Moreover, even though stakeholders and citizens are involved as shareholders in the NCZ 2030 Inc., they are needed in the Arena and the Common : (a) NZC Λ 2030, Inc. is *executive*, it must act efficiently and effectively, not deliberate. The Arena and the Commons on the other hand are spaces for discussion, solution co-design, where bold proposals can be made without fear of risk. (b) NZC Λ 2030, Inc. may be economically just within the capitalist system, but is not socially just. (Not every family can afford 1000€ for a share in NZC Λ 2030 and not every SME is willing to invest 10K€ for 10 shares.) So the three lines (Commons, Arean and NZC Λ 2030, Inc) express three qualitatively different pillars for the Transition.

10) **(a,b) The involvement of local and Mission cities.** Facilitates knowledge, skill and good practice transfer among cities. Scalability and transferability in both directions and stronger leverage towards central governments, the Mission and the EU. It strengthens collective wisdom (against a global problem) and allows activities to be assessed on their social, economic and climate merits.
11) **1-**4 lines (see Figure above) as briefly explained in this section facilitate the implemenation, upscaling and MEL in hundrends of projects related to the transition, after the main principle that everything is well-thought, transparent, inclusive and by implementing as smoother changes as possible.

The presented governance interventions are in line to the (6 pyramid sides) aspects of the Climate City conact for Lemesos, which are presented in the following figure.



C-1.2.a: Description of digitalization interventions – textual and visual elements

In order to effectively monitor and evaluate the results of the actions designed for the action plan, evaluate the indicators specified to measure the effects, improve the effectivity of all actions taken towards climate neutrality, and design others where needed an effective digital/smart system is needed.
This smart system is meant mainly to support and enrich the actions of the vertical thematics included in the action plan by incorporating real-time monitoring and data analysis, resources and device deployment management using Artificial Intelligence for automations and informed decision making, predictive maintenance and risk assessment may result in a more optimized energy usage, resources utilization, early identification of emission hotspots and carbon intensive activities.
In addition, we shall take advantage of the ubiquitous smartphone devices to empower citizens and communities by providing real-time notifications and results on their energy usage and carbon footprint raising in this way awareness and encouraging behavioural change. Lastly by allowing a seamless integration to all municipality services and data will embrace trustworthiness and will attract private investors to develop more and new smart apps and deployments and consequently further enhance the smart transformation of Limassol city.

Specifically, digital systems for enabling the Lemesos NZ Transition have the following functions:

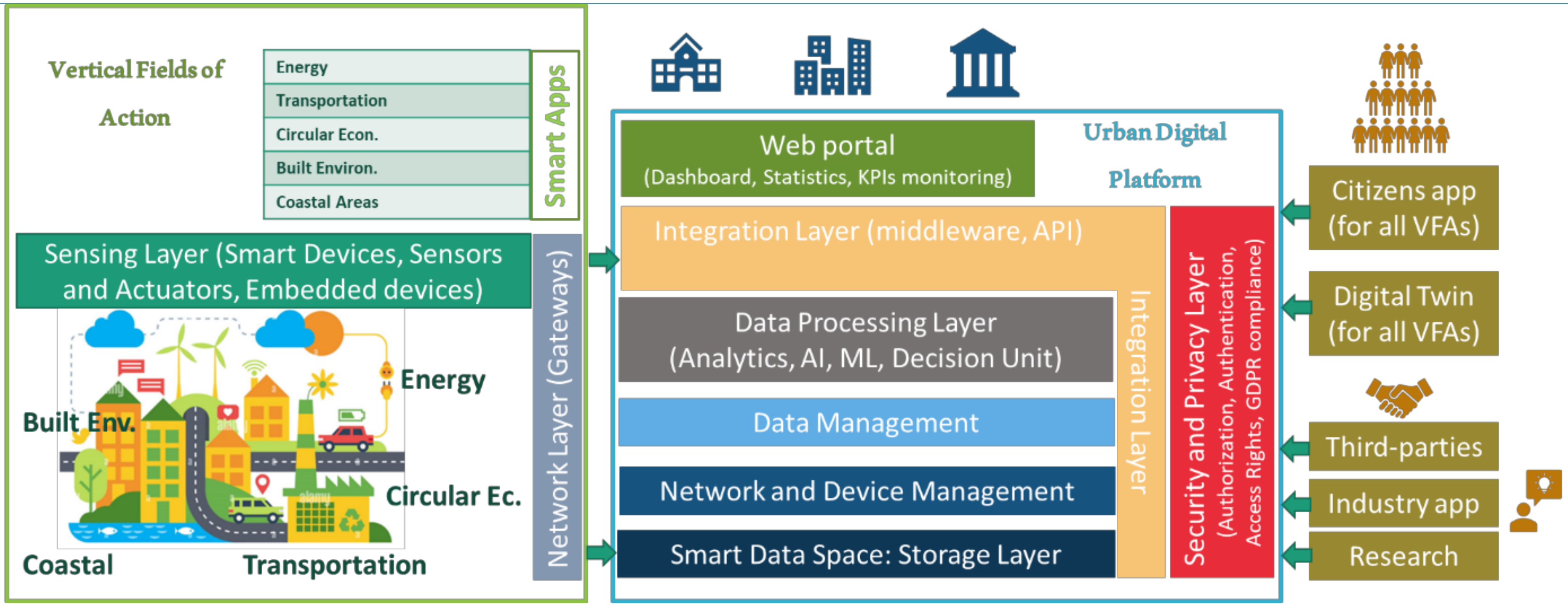
1. Observations and measurements (with sensors, sampling and other)
2. Data collection, validation, and (pre)processing
3. Repository (open data) and the Lemesos Digital Twin
4. Modelling (e.g. transportation TDM ref TMA4, MERA ref CPA4)
5. The Lemesos Climate Decision support system
6. Querying, Visualization and Reporting

The actions which have been designed to support the smart transition and digital transformation of Limassol city are the following:

1. Urban Digital Platform (UDP)

Design and develop a multi-purpose, inter-operable, scalable and secure urban digital platform on top of a smart infrastructure that will enable the secure collection, storage and analysis of smart-city related big-data to be utilized by the municipality and government in planning, implementation and decision-making, by the industry sector for leveraging smart and green innovation solutions, and by academia and researchers for new research opportunities, innovations and collaborations. The implementation of this action requires the close collaboration and coordination with all thematic areas which have proposed actions for this Action Plan, in order to fulfill their needs with respect to the infrastructure in terms of hardware, data management, processing and analysis as well as the pre-specified smart apps.

The UDP will be composed of six (6) layers:



Smart Infrastructure Management System: will be responsible to manage the connectivity and network protocols required for the deployment of the necessary infrastructure, i.e., devices (e.g., sensors, cameras), to fulfill the individual actions of the vertical field of actions.
Smart Space: will be responsible for Storage, Management, Processing and Analysis of various data formats that will be acquired from the Smart Infrastructure and incorporates various data related technologies such as data cleaning, data engineering, load balancing and task scheduling in cases of distributed storage.
Security and Privacy: will offer a secure storage and communication of data, as well as access control and guarantees regarding the privacy preservation of the end-users. In particular, this layer will include access-control mechanisms, encryption, firewalls, intrusion detection/prevention methods, thread-intelligence analysis and backups. Data Governance (Policies, Procedures, Standards) based on GDPR, data quality standards, data retention policies, user consent mechanisms, privacy impact assessment, EU compliance and regulations.
Web portal: Design and development of the urban digital platform web portal that will act as an admin back-office and it will offer content management, KPIs monitoring, data visualizations (e.g., charts, graphs, and dashboards), data analytics, data interpretations, actuations and notifications to each vertical field of action as well as centrally to the Limassol municipality from the data that will be generated by the smart infrastructure of each vertical thematic action.
Citizens Smartphone application: Optimize the features and extend the existing Municipality of Limassol (Dimotis Lemesou) application and extend it with new features and services for raising awareness regarding the EU mission and the thematic areas, providing incentives and rewards to stakeholders for being engaged with the municipality activities as well as via gamification for recognition of usage, incorporating smart app extensions for real-time notification, participation and decision-making on municipality issues.

Integration Middleware: design and develop a middleware following the design principles of a Service Oriented Architecture (SOA), which is a loosely coupled architecture that allows different systems and services to securely exchange and communicate public and privately held data and interoperable services through standardized interfaces, such as the Representational State Transfer Application Programming Interfaces (Rest APIs). This will enable the seamless integration of third parties (existing systems and applications), such as the Dimotis Lemesou application and the Cyprus Smart City platform, and new systems and services into the platform, as well as reduce the complexity of integrating different systems. The Minimum Interoperability Mechanisms (MIMs) framework developed by the Open and Agile Smart Cities (OASC) will be also taken into consideration

Additionally, the UDP can be further extended to support digital twin functionalities as follows:

Limassol Digital Twin: Design and develop a virtual replica of the Limassol city by combining data that will be acquired from the smart infrastructure (e.g., sensors, devices, systems) and will be processed, stored and analyzed in the urban digital platform data space. The Limassol digital twin will offer the opportunity to city planners, citizens, local enterprises, academia, researchers and experts to create a real-time 3D model of the city for (i) visualizing the city's physical environment accurately and have a more intuitive understanding of its processes, infrastructures and constraints, (ii) receiving insights about the city's current state and take intuitive and instant decisions to dynamic changes, (iii) simulating different scenarios and predict future outcomes, and (iv) offering transparency to citizens and consequently empowering them to participate in decision-making processes as well as collaborate with the authorities and the industry sector. This action will be executed with the close collaboration of the vertical thematic areas based on their needs and requirements, if any and if they can realistically be aligned with the digital twin concept.

2. Smart Apps & Intelligent Modules

Design and development of dedicated smart apps and digital solutions, to monitor and control specific activities, make data-based decisions and automate actions to optimize usage of energy, and predict needs. The smart apps are meant to extend the existing citizens app (Δημότης Λεμεσού) and allow users to enable them based on personal needs and preferences.

The specific smart apps will be developed to support the digitalization needs of all vertical fields of action (and emission producing sectors of Limassol). Examples of some applications which are thought can be found below:

- **Energy Systems**: vehicle-to-grid optimization for optimal storage of the energy generated by EV chargers to vehicles.
- **Mobility & Transport**: optimal topology and network design for pedestrians,
- **Waste & Circular Economy**: optimize donations of perishable and non-perishable items to avoid landfilling of still useful and functional items
- **Coastal**: pollution risk assessment for blue infrastructure management, including monitoring, risk assessment, prevention, and detection
- **Built Environment**: optimize energy consumption by controlling thermal environment, and obtaining real time energy usage to evaluate performance and detect energy wasteful activities

3. Enhance the utilization of digital resources utilizing co-workshops

In order to take advantage of the full capacity of the digital resources to be developed by Limassol, these resources must reflect real-time situations, need to be user-friendly and consider the specific needs of various stakeholders, with different interests. For this purpose we plan to consult with stakeholders

(government, municipality, citizens, experts, academia, industry) to ensure just representation in the implementation of the Limassol digital solutions, as well as run targeted awareness campaigns, trainings and workshops to educate citizens, local enterprises and stakeholders about the benefits of the digitalization of Limassol.
More specifically in order ro expand the utilization of the digital resources to be designed we will develop a strategy, which will include the following :

- Targeted awareness campaigns, trainings and workshops to educate citizens, local enterprises and stakeholders about the benefits and functionalities of the urban digital platform and smart apps through various channels (e.g., social media, websites, community events, and local media.)
- Encouraging and supporting local businesses, startups, and organizations to develop innovative apps that leverage the platform's capabilities by showcasing the value they add to residents' lives, as well as by promoting data sharing and providing open APIs for developers and entrepreneurs to integrate the platform's data and functionality into their own apps.
- Incentives and rewards (such as discounts and special offers) or recognition programs (e.g., through gamification elements that promote engagement and usage) to encourage citizens and businesses to actively use the urban digital platform, the citizens app and the smart apps.
- Promotion of success stories and use cases to inspire broader adoption through the implementation of pilot projects within the municipality boundaries that will demonstrate the benefits of utilizing the urban digital platform and real-life smart applications.
- Establish a variety of channels for actively listening and collecting the user needs, feedback and preferences in order to address issues and incorporate enhancements on the urban digital platform, the citizens app and the smart apps.
- Collaborations with the academia (e.g., universities, research centers and centers of excellence) for incorporating the urban digital platform and smart apps into their curricula and/or research projects.
- Awareness campaigns for data handling practices, compliance with regulations, and measures taken to protect user privacy and sensitive information

5.2 Module C-2 Social and Other Innovation Interventions

Module C-2 “Social and Other Innovation Interventions” consists of a summary table, listing organizational and collaborative governance interventions and describing their impact (C-2.1) and a section for more detailed descriptions and comments (C-2.2).

C.2.1: Enabling social innovation interventions (list of selected initiatives)

Intervention name	**1. “Let 100 flowers bloom”**
Description	Social innovation will be framed into a bundle project aiming to promote citizen- and stakeholder-driven climate-related initiatives, such as interventions #2-9 below. Groups of citizens and stakeholders will be invited and encouraged to submit ideas and project outlines to be developed in collaboration with Lemesos Mission.

	Ideas like "car-free roads" proposed by school pupils would go through a co-workshop to constructively deal with objections (from shop owners for instance), developed and tested for a short time, with open monitoring and learning. Both the social approach and the field intervention result would reach the Lemesos Commons to be upscaled or transformed -or rejected, in all cases adding to the collective constructive approach for the Lemesos Transition. Hundreds of such ideas will be collected and the ones with support will be turned into small-scale projects; grouping them into a bundle will facilitate their administration, communication promotion and multiply their impact.
Responsible entity/dept./ person	Municipality; Mission; the "Lemesos NZ 2030" organization
Timeframe	2024 -2030 (and beyond)
Size/scale	Local and municipality level (groups of citizens/stakeholders involved in each initiative; per project: from 5-10 citizens e.g., preserving a micro-forests to 100s e.g., cleaning the coastal front)
Estimated cost	10K-40K€ per project (2 million euros total)
Funding	Municipality; Mission; Social corporate responsibility; private funding/donation
Involved stakeholder	Citizens, NGOs, Private companies, municipality
Enabling impact/link to Mission	Addressing social attitude-related barriers (e.g., helplessness, indifference to common action and collaboration against climate change). Enable projects that have a higher potential for social acceptance and upscaling.
Co-benefits	Dissemination; improved collaboration; social change
Intervention name	**2. Smart city Accelerator**
Description	TWSB is an initiative involving architects and economists planning to take the legal form of an NGO (2024). The aim is to develop an ecosystem for cross-sectoral (multistakeholder) collaboration and administering social interventions within the scope of the Mission. Among the objectives (currently under development) are: 1) Create a community space for a green economy, based on humanism principles 2) seed values (e.g., collaboration, co-design, co-develop) for micro-scale projects An Indicative example of planned interventions by TWSB (in collaboration with the Mission and the projects bundle see point #1 above) is the ***Smart City Accelerator*** - An incubator to reveal and support the existing local initiatives which fall within the Mission scope (startups; scaling-up). This could be further supported by the Mission Taskforce (e.g., STeDI-RC the CyI).
Responsible entity/dept./ person	The NGO TWSB
Timeframe	(2025-2030 and beyond)
Size/scale	Micro- and macro-scales
Estimated cost	100,000 euros for 2025-2027 (set up the incubator and support 2-3 representative small-scale projects)
Funding	Municipality; Government; Erasmus+; Social corporate responsibility; Private donations

Involved stakeholder	Citizens, policymakers, urban planners, politicians (ideas development)
Enabling impact/link to Mission	The Lab will function as a supportive think tank and a social governance platform for the municipality in achieving the Mission objectives. Micro-scale; fast implementation of projects.
Co-benefits	Multidisciplinary approaches and collaboration support co-benefits relevant to environmental and human health. Clusters for social innovation support financial stability (e.g., EU funding). Green jobs.
Intervention name	**3. metaCCAZE**
Description	metaCCAZE's vision is to accelerate the deployment of smart systems that combine electric automated and connected mobility in 10 mission cities. Activities (indicative): - MetaDesign activities with multisector stakeholders and different population groups (citizens) to develop zero-emission shared mobility (ZESM) use cases. - MetaInnovations toolkit, developed consisting of six main technologies (e.g., AI) to enable combined electrification, automation and connectivity. - Metaskills Hub, lessons learned; planning skills
Responsible entity/dept./ person	Municipality, academia, NGO
Timeframe	2024-2026
Size/scale	Lemesos City
Estimated cost	Approx 1 million euros
Funding	EIT Climate KIC
Involved stakeholder	Businesses, academia & science, civil society initiatives Academia, scientific institutions, private sector
Enabling impact/link to Mission	metaCCAZE deals with one of the most important GHG emission sectors; transportation. Involving citizens in use cases design and implementation directly supports Mission objectives.
Co-benefits	Innovation; green jobs; Dissemination; citizens engagement
Intervention name	**4. Car-free road/ local level**
Description	Pedestrianization of a main road.
Responsible entity/dept./ person	Limassol Municipality/ Technical Department, Wardens
Timeframe	2024-2025
Size/scale	Local
Estimated cost	Approx. 250,000 euros
Funding	Municipality
Involved stakeholder	Private businesses Citizens

	Municipality
Enabling impact/link to Mission	Citizens' and stakeholders' involvement in activities should be upscaled to achieve the NZC goals. Behavioural change; dissemination
Co-benefits	Environmental and public health benefits (due to decrease in road traffic)
Intervention name	**5. Car-free day/ city block level**
Description	Areas in the city (or the whole city) are closed to cars
Responsible entity/dept./ person	Municipality, Citizens, NGOs
Timeframe	2023-2030
Size/scale	Microscale
Estimated cost	NA
Funding	Possibility to attract funding for dissemination and communication activities incorporated in the car-free days (e.g., Mission, Municipality, Public and Private funding)
Involved stakeholder	Municipality, Technical department, wardens, NGOs, academia, citizens
Enabling impact/link to Mission	Pilot projects for reducing GHG emissions and pollutants relevant to road traffic
Co-benefits	Environmental and public health
Intervention name	**5. Weekly cycling promotion interventions**
Description	Organized bicycle rides of citizen groups on city roads and bicycle routes. A selected day per week in several areas of the city.
Responsible entity/dept./ person	Citizen groups in collaboration with the municipality and NGOs
Timeframe	2023-2030
Size/scale	City Level
Estimated cost	200-500 euros per weekly promotion event (the cost for renting 20-50 bikes for 3 hours per week x 52 weeks = 26,000 max per year)
Funding	Municipality and corporate social responsibility
Involved stakeholder	Local citizens, NGOs, private companies (e.g., Next Bike), public agencies
Enabling impact/link to Mission	Promote car-free transportation (to reduce GHG emissions)
Co-benefits	Public health, dissemination and visibility, behavioural change
Intervention name	**6. Architectural walks**
Description	NGO Initiative “for Lemesos” (GR YIA TI LEMESO)
Responsible entity/dept./ person	NGO
Timeframe	2023-
Size/scale	Local (city neighbourhood level)
Estimated cost	NA (voluntarily)
Funding	Possibility to attract funds and include activities related to the mission (e.g., identification of possible areas for deep building renovation; pollution)
Involved stakeholder	NGO

Enabling impact/link to Mission	Support Education/training/Culture tailored to achieving the involvement of citizens in Mission initiatives.
Co-benefits	Stakeholders' engagement
Intervention name	**7. Beach clean-up**
Description	Organized waste collection from the city seafront and nearby beach
Responsible entity/dept./ person	CSTI; CITY FRIENDS CLUB
Timeframe	2019-ongoing
Size/scale	Coastal areas of the city (2-3 km)
Estimated cost	NA
Funding	Possibility to attract funds (EU, RIF, ERASMUS+, Municipality, Corporate social responsibility)
Involved stakeholder	Citizens, NGOs, municipality
Enabling impact/link to Mission	Support favourable attitude to achieve the involvement of citizens in Mission philosophy and initiatives.
Co-benefits	Environmental protection (attitude)
Intervention name	**8. Empty plots clean up**
Description	Initiative for cleaning small plots and urban spaces at the road/neighbourhood scale
Responsible entity/dept./ person	SAVE YOUR HOOD (citizens initiative)
Timeframe	2023-
Size/scale	Micro-scale
Estimated cost	Voluntarily
Funding	Possibility to incorporate tasks in funded projects; municipality funding; private funding
Involved stakeholder	Citizens, NGOs, Municipality, academia
Enabling impact/link to Mission	Citizens' involvement (voluntary) in initiatives related to sustainability and caring about the city (shared) space.
Co-benefits	Environmental protection, public health
Intervention name	**9. "Tiganokinisi"**
Description	Collection of used cooking oil at schools; biodiesel production demonstration
Responsible entity/dept./ person	AKTI (Environmental Research)
Timeframe	2014-ongoing
Size/scale	District (selected schools)
Estimated cost	NA (state-funded)
Funding	NA
Involved stakeholder	Citizens (students)
Enabling impact/link to Mission	Sustainable waste management; circular economy; education and training of younger people (next-gen)
Co-benefits	Environmental protection; behavioural change

Intervention name	10. Green theatre group
Description	Creating and promoting a “green strategy” for theatre productions and operation
Responsible entity/dept./ person	Theatres in the city (PATTICHIO, RIALTO, ETHAL)
Timeframe	2023-2030
Size/scale	District
Estimated cost	100,000 euros
Funding	(Social corporate responsibility; Theaters own budget; donations)
Involved stakeholder	Private and public sector, citizens, municipality, academia, NGOs
Enabling impact/link to Mission	Reducing GHG emissions in the entertainment sector; dissemination and visibility for the Mission
Co-benefits	Environmental protection; dissemination and visibility; education and culture

C-2.2: Description of social innovation interventions – textual and visual elements

The systemic barriers for the NZC are presented in detail in the introduction (strategy presentation) of the AP. Briefly, there are barriers such as the citizens' apathy toward climate change and urban environmental quality – public health (Social attitude). Moreover, there is reduced competence (regulatory; human resources) for the municipality to act and the current city plan is not tailored to drive mitigation and adaptation to climate change. To overcome such barriers, initiatives such as “allowing 100 flowers to bloom” are important. Social innovation will be framed into a bundle project aiming to promote citizens and stakeholders-driven initiatives (e.g., see Table C2.1), in line with the Mission objectives. Ideas for such projects will be co-designed / co-developed (see LC3 co-workshops). The citizens by following this approach will receive support for materializing their ideas into upscalable (and, why not, profitable; see accelerator) projects, considering objections (Lemesos Commons). This activates citizens and stakeholders and unifies them in concrete climate actions. MEL and the entire process allow (via adult/VET education) the improvement of quantity and quality of human resources. Of course, social innovation would not solve all the issues related to NZC, but it is an important stepping stone. Additionally, projects and initiatives under the umbrella of the NZC Mission (such as LC3 and metaCCAZE) are also driving social innovation and supporting capacity building for the municipality, the citizens and the stakeholders.

External barriers are also taken into consideration; namely the lack of connection to the mainland which results in expensive supply chains for Cyprus, the short period for huge changes (2024-2030) and the fact that the emissions are not visible. This last is of great importance and highly relevant to social innovation and stakeholders' engagement. There is no direct benefit of city-only emissions reduction and even worse, Lemesos and the EMME region are considered hotspots for climate change (e.g., 2 ^{o}C global is 3+ regional). This enhances apathy (“I do not care”) and the feeling of helplessness (“I cannot fix this, government should”). Nevertheless, the healthy human attitude against helplessness in times of crisis and the citizens engagement and social innovation components of the NZC missions should be strong and ambitious.

A key initiative (linked to governance plus social innovation; in combination to the “100 flowers”) for NZC is the “Lemesos Commons” (there is detailed description of its role in many parts of the AP and there is a separate preparatory project already running; we avoid repeating details here). The participatory co-workshops will foster stakeholder engagement (and social innovation) by filtering and preparing the pilots (e.g., “let 100 flowers bloom”) and most important the upscaling of projects to reduce GHG emissions, as well as “chaos” management (e.g., see “the X curve example during the transition pathway). It is importance to stress once again, the “no-one left behind” principle and the random selection of stakeholders (those who disagree are in the spotlight).

Moreover, there are many examples presented in Table C2.1 that supprort social innovation, in various scales (micro and macro).
From
Urban labs; multi-stakeholder engagement; SME accelerators for green economy; EIT Climate KIC intrernational projects and use cases
to
citizens taking care of cleaning of our own areas; roads; coastal front and beach
and
avoid the use of car and promote alternative no GHG emissions bicycle rides.

Micro and macro scale should go in combination. It is equaly important to engage a group of interested citizens, to discuss and argue with deniers, with attracting millions of euros for piloting and upscaling.

Finally (equally important), there is a need to tune the communication campaign (linked to stakeholder engagement and social innovation):
“focus on heat and public health instead of GHG”;
“on sea pollution instead of seagrass”;
“on personal money savings instead of social energy savings”;
“balance motivators (personal job opportunities; …) and restrictive/prohibitive measures (parking; traffic; building property transfer)”.
Also highlight adaptation to climate change and nature based solutions at small and larger scale. A microforest or the unification of green spaces will act towards cooling the city and allow people enjoy the city, even if there is a 3 degrees increase by 2050.

Boosting social innovation (and engagement) is the number one component in zero emissions as well as improving the environmental and human health conditions, in Lemesos and beyond.

5.3 Module C-3 Financing of Action Portfolio

Module C-3 “Financing of Action Portfolio” should contain the list of action portfolios and interventions outlined in Modules B-2, and those from C-1 and C-2 with cost implication to provide a summary list of interventions that need to be unpacked in the Investment Plan.

C-3.1: Summary of interventions with cost implication (to be unpacked in Investment Plan)					
Action/ intervention name	Responsible entity and person	Start/end date	Field of action	Impact	Total cost estimated
(list action portfolios and interventions from Modules B-2, C-1 and C-2, which have a cost implication)	(indicate responsible entity and person)	(indicate start and end date of the activity)	(indicate the field of action the interventions belongs to)	(indicate impact - i.e. the GHG reduction/ co-benefit)	(indicate the total costs in €, estimated for the intervention)
Change in electricity production mix (EA_0: Change Electricity Mix)	National authorities	1.11.2024/ 31.12.2030	Energy	Emissions in 2018 in Limassol was 396,340 tCO2 based on an emissions factor of 0.874 tCO2/MWh and a consumption of 453 GWh of electricity. Assuming electricity consumption increases in line with national trends for 2030, and emissions based on the 2030 NECP factor (0.285 tCO2/MWh), the reduction is: 226,613 tCO2 This is 31.4% of the emissions of Limassol in 2018	217.2 M€
Install a large-scale photovoltaics park and establish an energy community (EA_1: PV Park & Energy Community)	Limassol Municipality	1.1.2024/ 31.12.2030	Energy	The park will generate 3,241 MWh which can be subtracted from the energy consumed by the national grid, resulting in **2,833 tCO2** saved, which translates to 0.2% of the city’s emissions.	6.36 M€
Install Fresnel systems to provide Industrial process heat (EA_2: Fresnel System)	Local SMEs, overseas tech providers, local expert engineers/scientists for initial system design and cost estimation	1.1.2024/ 31.12.2030	Energy	Assuming an emissions factor equal to 0.267 tCO2/MWh for the combustion of diesel, substituting this will result in reductions of **468 tCO2** **This will lead to a reduction of 0.07% of city’s emissions.**	3.45 M€

Renewables in residential buildings with behind-the-meter storage *(with built environment)* (EA_3: Residential RE with storage)	Building owners	1.1.2024/ 31.12.2030	Energy	The units will generate 64,824 MWh/a which can be subtracted from the energy consumed by the national grid and lead to a reduction of **56,656 tCO2** This will result to a reduction of approximately 8.9% of the total city's emissions.	89.26 M€
Installation of heat pumps at commercial and residential buildings *(with built environment)* (EA_4: Heat Pumps-residential)	Building owners	1.1.2024/ 31.12.2030	Energy	Heat pumps do not directly generate renewable energy but are efficient converters of ambient energy to either heating or cooling using electricity. In the scenario examined for this report they are estimated to generate 10,800 MWh of heating and 19,200 MWh of cooling each year. Despite the fact that replacing older stock of inefficient A/C split units in existing buildings will be a realistic method to reduce energy demand, this action focusses on replacement of fossil fuel-fired heating systems only. The action will lead to a net reduction of 8,121 tCO2, which translates to 1.28% of the total city's emissions	20.20 M€
Centralised RES generation and long-term storage to satisfy increased demand from Mission actions (EA_5: RES generation and long-term storage)	Limassol Municipality Local EPC International suppliers and EPCs	1.1.2024 – 31.12.2030	Energy	It is estimated that approximately 137 GWh/a will be generated from the combined PV, wind and storage subsystems. We assume that 80% of generation will be matched with demand, and 20% will be sourced from the grid. The whole system will substitute generation that will save 119,335 tCO2eq., around 19% of the Limassol's total.	96.70 M€
Deep building renovation (BA_1: Deep building renovation)	• Limassol Municipality for the municipal buildings and implementation, monitoring and evaluation of the action. • Government for the renovation of governmental buildings	1.1.2024 – 31.12.2030	Built environment	**Long-term impacts** - Reduced GHG emissions - Increased rate of retrofit - Reduced energy demand, needs, or consumption - Reduced energy poverty - Increased carbon sequestration Generated renewable energy 38,520 MWh/yr @ 2030 Removed/substituted energy, volume or fuel type 89,125 MWh/yr @ 2030 GHG emissions reduction estimate 200,386 tonCO_2-eq/yr @ 2030 **Co-benefits** - Improved air quality	348.4 M€

	• Private building owners.			- Reduced heat island effect - Enhanced physical and mental well-being, comfort and productivity - Improved access to information, awareness & behaviour change - Increased number of skilled jobs & rate of employment - Increased urban forestry, plantation & improved plant heath - Improved nature restoration - Increased resilience to climate change - Increased property value and Decreased future maintenance & capital costs	
New carbon-neutral buildings Action (BA_2: New carbon-neutral buildings)	• Limassol Municipality for municipal buildings • Government for governmental buildings • Private building owners	1.1.2024 – 31.12.2030	Built environment	**Long-term impacts** - Reduced GHG emissions - Increased energy efficiency - Reduced energy demand, needs, or consumption - Reduced energy poverty - Increase carbon sequestration Generated renewable energy 2,502 MWh/yr @ 2030 Removed/substituted energy, volume or fuel type 6,731 MWh/yr @ 2030 GHG emissions reduction estimate 5,938 tonCO_2-eq/yr @ 2030 **Co-benefits** - Improved air quality - Reduced heat island effect - Enhanced physical and mental well-being, comfort and productivity - Improved access to information, awareness & behaviour change - Increased number of skilled jobs & rate of employment - Increased resilience to climate change - Increased property value and Decreased future maintenance & capital costs	51.8 M€
Urban Regeneration (BA3_Urban regeneration)	Limassol Municipality	1.1.2024/ 31.12.2030	Built Environment	**Long-term impacts** - Reduced GHG emissions - Increased carbon sequestration Generated renewable energy 36,794 MWh/yr @ 2030	168 M€

				Removed/substituted energy, volume or fuel type 109,561 MWh/yr @ 2030 GHG emissions reduction estimate 76,225 tonCO_2-eq/yr @ 2030 **Co-benefits** - Improved air quality - Reduced heat island effect - Enhanced physical and mental well-being, comfort and productivity - Increased urban forestry, plantation & improved plant heath - Improved nature restoration - Increased resilience to climate change	
Implementation of Public Transportation Strategies (TA_1: Public transportation strategies)	Limassol Municipality; Ministry of Transport Communications and Works; Transport Operators	1.1.2024/ 31.12.2030	Mobility & Transportation	Reduction of 10,845 tCO2 by 2030 (6% reduction)	23.10 M€
Enhancing Micro-mobility Modal Split (TA_2: Micro-mobility modal split)	Limassol Municipality; Micro-mobility Operators; Ministry of Transport Communications and Works; Citizen's representatives (NGOs)	1.1.2024/ 31.12.2030	Mobility & Transportation	Reduction of 14,736 tCO2 by 2030 (8% reduction)	41.54 M€
Development of Comprehensive Pedestrian Network (TA_3: Comprehensive Pedestrian Network)	Limassol Municipality; Ministry of Transport Communications and Works; Department of Town Planning and Housing; Citizen's representatives (NGOs)	1.1.2024/ 31.12.2030	Mobility & Transportation	Reduction of 7,368 tCO2 by 2030 (4% reduction)	3.7 M€

Establishment of Vehicle Electrification Strategies (TA_4: Vehicle Electrification)	Limassol Municipality; Ministry of Transport Communications and Works; Ministry of Energy, Commerce and Industry; Electrical Utility Operators; Citizen's representatives (NGOs)	1.1.2024/ 31.12.2030	Mobility & Transportation	Reduction of 92,385 tCO2 by 2030 (51% reduction)	45.81 M€
Strategies Improving the Efficiency of Freight Transportation (TA_5: Improving Efficiency of Freight Transportation)	Limassol Municipality; Freight Operators; Ministry of Transport Communications and Works; Ministry of Commerce, Energy and Industry; Cargo operators; Citizen's representatives (NGOs)	1.1.2024/ 31.12.2030	Mobility & Transportation	Reduction of 9,439 tCO2 by 2030 (5% reduction)	35.45 M€
Optimization of Transportation Demand (TDM Strategies) (TA_6: TDM Strategies)	Limassol Municipality; Ministry of Transport Communications and Works; Department of Town Planning and Housing; Citizen's representatives (NGOs)	1.1.2024/ 31.12.2030	Mobility & Transportation	Reduction of 8,786 tCO2 by 2030 (5% reduction)	27.27 M€
Incorporation of Smart Technologies in Sustainable Transportation Strategies (TA_7: Smart Technologies in Sustainable Transportation)	Limassol Municipality; Ministry of Transport Communications and Works; Deputy Ministry of Research, Innovation and Digital Policy; Citizen's representatives (NGOs)	1.1.2024/ 31.12.2030	Mobility & Transportation	Reduction of 8,780 tCO2 by 2030 (5% reduction)	17.73 M€
Waste segregation to remove organic waste for energy and fertilizer production (WA_1: Removal	Limassol Municipality; Department of Environment. In addition, the support	1.1.2024/ 31.12.2030	Waste management	As estimated based on the available data, 54176 tons per year mixed MSW go to the landfill.	54 M€

of organic waste for energy and fertilizer production)	from Information Technology experts for integrating smart systems like RFID or barcodes is required. Green Dot Cyprus (recycling). Citizens of Limassol play a vital role in sustainable MSW management.			According to available data on RE from organic waste in Cyprus (CYPRA-KEBE) 87.152 kWh are produced per ton of organic waste. Diverting 24779 tons/year of organic waste to produce RE will yield 2159 MWh of electricity. As estimated based on the available data, 54176 tons per year mixed MSW go to the landfill. GHG (tCO2eq) = **43341** (54176 tons x 0.8 tons CO2eq/ton MSW) + 6501 (15% x 43341; emissions for collection and transporation) = **49842** Reducing by 90% the amount of organic waste that goes to the landfill results to **-82.8% reduction in these emissions (41277 tons CO_2eq)**.	
Zero waste production (circular economy) in Lemesos (WA_2: Zero waste production)	Limassol Municipality	1.1.2024/ 31.12.2030	Waste management	The removal of 90% of the organic waste and 75% of the recyclable waste from the landfill leads to a reduction of 65% in the waste that goes to the landfill. Moreover, avoide waste generation (e.g. e-billing, pay as you throw) will lead to -50% of the emissions related to waste collection and transportation. Removing of organic (and paper, textile, wood) waste will decrease emissions from the landfill. GHG (tCO2eq) = **43341** (54176 tons x 0.8 tons CO2eq/ton MSW) + 6501 (15% x 43341; emissions for collection and transporation) = **49842** Reducing by 90% the amount of organic waste and 75% of the recyclable material that goes to the landfill results to **-90.5% reduction in these emissions (45087 tons CO_2eq)**. Action 2 contribution to GHG emissions reduction is **4753 tons CO2eq.**	6 M€
Design and Development of Cold Ironing Infrastructure for the Limassol Port (CA_1: Cold Ironing in the Limassol Port)	Port Authorities, Energy Providers, Regulatory Bodies, EAC	1.1.2024/ 31.12.2030	Coastal and Sea, Energy	22.960 tCO2	35.4 M€

Carbon Neutrality in Blue Infrastructure – The case of Limassol Marina (CA_2: Limassol Marina energy community)	Limassol Marina (Data provider, investor) Marina Tenants and stakeholders (data providers, co-investors) Limassol Municipality EAC External Experts (specific studies)	1.1.2024/ 31.12.2030	Coastal and Sea, Energy	Core target of the project is the development of the Carbon Index (value 100, basis year 2022), The RES investments will deliver an average reduction in critical emissions (CO_2, SOx, NOx, PM) at least by 70%-80% **5,770 t CO2e/yr**	2.80 M€
MERA - Mitigation of Risks to the Coastal Area through Technology Tools and Integrated Data Management (CA_3: MERA)	Limassol Municipality	1.1.2024/ 31.12.2030	Coastal and Sea	Reduction of the number of polluting incidents to be calculated in natural numbers. Calculations will be based on the number of marine polluting incidents occurring annually, divided by the number of polluting incidents occurred in the baseline year 2022.	200.000 €
RECONE - Resilient Coastal Neighbourhoods (CA_4: RECONE)	Limassol Municipality, NGOs, Local authority, Local residents action group	1.1.2024/ 31.12.2030	Costal and Sea, Built Environment, Mobility & Transportation Energy	1234 tCO2 and calculated within actions of various emission sectors	11.61 M€
Assessing carbon stock and sinking potential of seagrass meadows in Limassol coastal waters and pilot restoration (CA_5: Seagrass meadows in Limassol-carbon sinking and meadow restoration)	Limassol Municipality Department of Fisheries and Marine Research	1.1.2024/ 31.12.2030	Coastal and Sea, Energy	Increase C sinking potential. Impossible to give a reliable estimate at this point. It is estimated that carbon fixation can be >1 ton C per hectare per year, carbon stock in the matte might reach >1500 tons of C per hectare. Biodiversity preservation and restoration.	1 M€

Wave Energy Harnessing for Water Desalination (CA_6: Wave energy production)	Limassol Municipality	1.1.2024/ 31.12.2030	Coastal and Sea, Energy	**The pilot WEC desalination system, 6x100 metres** 230 tonnes CO_2e, 1% to 4.2% reduction of Limassol's estimated emissions for water desalination **The optimised scaled up WEC water desalination system, 1152 m^2** **437 tonnes CO_2e, 1.85 % or 8% reduction of Limassol's estimated emissions for water desalination**	1.7 M€

6 Outlook and next steps

This section should draw any necessary conclusions on the Action Plan above and highlight next steps and plans for further refining the Action Plan as part of the Climate City Contract.

6.1 Plans for next CCC and Action Plan iteration – textual elements

The process of drafting a complete Lemesos CCC under a strict deadline has been instructive. The teams preparing it as well as Stakeholders contributing already have several improvements, issues for further clarification, stakeholder discussion, and other detailed changes to make to the September 2023 version submitted in the March 2024 version planned.

We consider the CCC as the structured repository of our Transition Plan with continuous modifications and public versions every 6 months, with a major update every March and a minor every September. A whole digital system will be built around it allowing Monitoring (both detailed technical and broader political and social), Evaluation (using the originally thought KPI’s and others that will emerge) and most significantly Learning (for those involved in implementation, for scaling and for transferring to other cities).

In the second half of October 2023, we shall produce in Greek (and English, for the large population of foreigners living in Lemesos) a layman’s version of the CCC, the “Lemesos Climate Transition Roadmap”, as a basis for extensive discussions with Stakeholders (who typically are ‘laymen’ regarding areas beyond their respective competences) and especially Citizens. These discussions will be held in the form of Co-workshops (Participatory solution co-design workshops) i.e., long-term discussion bodies. The results from these co-workshops with all Stakeholders and Citizens will be incorporated in the March 2024 edition of the Lemesos CCC.

Although the present CCC is the result of consultations between City decision makers and scientists with other Stakeholders and the public, few people have seen it as a whole and studied it in detail. The period October 2023 – March 2024 will be suitable for such a public interactive consultation. As it coincides with municipal elections campaigns (planned for May 26 or June 9) it is a good opportunity for active involvement and making the Lemesos Climate Transition and Mission participation a subject for broad consensus as it has been so far, rather than a polarizing one -although, of course, specific Transition issues will be. Furthermore, since the municipal elections will be held on the same day as the election for European Parliament, it will also be an opportunity for asking all European Parliament candidates not only to embrace the Lemesos CCC in abstract, but to have specific opinions and make specific promises for supporting the NZC Mission at EU level.

A particular issue to be dealt with in the March 2025 edition of the CCC is the potential inclusion in the Transition of the whole municipality area after the 2024 Cyprus municipal reform. The new L.M. will include an adjacent, currently independent, municipality (Mesa Geitonia) and an adjacent, also currently independent, community (Tserkezi). It is clear that the various Action Portfolios of the CCC could be extended to the new areas with different degrees of difficulty; this challenge will be a matter of study and discussion in 2024-25.

7 Annexes

Add any textual or **visual material** to the 2030 Climate Neutrality Action Plan in the ANNEX as necessary.

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments of Lemesos

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Disclaimer

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Table of contents

1 Introduction

Explain your city's motivation to join the EU Mission "100 climate-neutral and smart cities by 2030" and highlight your city's present commitments to climate action. You may also want to include the aims of this document.

Your text
Limassol's Climate City Contract (CCC) is a living document, documenting the commitment of the city to reaching climate neutrality by 2030. As such, it is a constantly evolving document aligned with the broader policy framework at the EU, National and local (city). By this, it is ensured that the efforts will be not only complementary to those of other stakeholders, but also transferable to other cities the policies of which are driven by EU Strategies and directives. Main drivers of all proposed actions are: • The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015 • The Paris Agreement, which is an international agreement to reduce greenhouse gas emissions. • The EU Green Deal, which is a set of policies and regulations aimed at making the EU climate neutral by 2050. • The National Energy and Climate Plan which is looks into detail at the national targets up to 2030, and serves as a basis for an ambitious long-term strategy aiming towards the minimisation of greenhouse gas emissions by 2050. • Other National Strategies, Policies and Legislations mainly related to energy, transport, the built environment and waste management. These policies are detailed in Module A-2 Table A-2.1 of the AP. Using these policies as reference to all actions, we can ensure that our proposed actions are ambitious, relevant and achievable, while enabling the necessary political support at national and EU level. The CCC objectives can only be achieved if supported by a broad coalition of stakeholders. In this direction, links at multiple levels of governance have been established already at the early stages of design, including all relevant stakeholders such as the city's local government, the national government, local business community, civil society organizations as well as citizens. Examples of how the CCC creates links at multiple levels of governance: • We work with the national government to secure dedicated funding for actions related to the climate. • We partner with businesses to develop and implement climate-friendly solutions. • We engage with civil society organizations and citizens to raise awareness of climate change and to build support for climate action.

2 Goal: Climate neutrality by 2030

Articulate your 2030 climate neutrality ambition, as expressed and defined in your Cities Mission Expression of Interest (EoI). This should include your ambition and commitment to a 2030 horizon as a whole city, as well as describe any exclusion areas and summarise how these areas would be addressed beyond 2030. (A more detailed plan for exclusion areas should be included in the 2030 Climate Neutrality Action Plan.) Your 2030 ambition should be supported at a minimum by a Council decision, and it is recommended that it is also supported by a wider stakeholder group. We also recommend you to list other co-benefits you aim to achieve when working towards the climate neutrality goal, like well-being, health, equity, justice, financial savings.

Your text

Lemesos Municipality's 2030 climate neutrality ambition is a visionary and comprehensive commitment to address the pressing challenges of climate change while fostering a sustainable and thriving community. This ambitious goal centers on achieving carbon neutrality within the municipality's jurisdiction by the year 2030. At its core, this initiative recognizes the urgency of mitigating climate change, it aligns with international efforts to limit global temperature rise and it encompasses a multifaceted approach with various key elements.

The municipality will undertake significant efforts to reduce greenhouse gas emissions across sectors. This includes transitioning to clean and renewable energy sources, enhancing energy efficiency in municipal operations and buildings, and promoting sustainable transportation solutions to reduce emissions from vehicles. It is committed to expanding and enhancing green spaces and urban forestry aiding in carbon sequestration. It is embracing circular economy principles, which aim to reduce waste generation and promote recycling and resource efficiency. Building collaborations with governmental agencies, nonprofits, and the private sector has been pooling resources, knowledge, and expertise in climate action.

Furthermore, the commitment to reach climate neutrality goes beyond mere environmental considerations; it also brings forth a multitude of co-benefits that significantly enhance the city across various dimensions. These co-benefits encompass social, economic, environmental, health, and governance aspects, all contributing to a more sustainable and prosperous future.

1. Social Benefits:
    a. Meaningful and Impactful Participation: The Climate City Contract of Lemesos encourages active involvement from its residents. Citizens can engage in local sustainability projects, such as community gardens or energy-efficient building initiatives, fostering a sense of ownership and pride in their city's progress.
    b. Justice: Lemesos City is committed to addressing environmental justice issues. By ensuring equitable access to green spaces and clean air, the Contract promotes social justice, benefiting all citizens, particularly marginalized communities.
    c. Cohesion and Peace: Climate initiatives strengthen the bonds between Lemesos residents. Collaborative efforts on climate projects promote social cohesion, reducing social tensions and enhancing peace and harmony within the city.
2. Economic Benefits:
    a. Sustainable Growth for All: The Climate City Contract fosters sustainable economic growth. Investments in renewable energy and sustainable transportation create jobs and stimulate economic development, ensuring long-term prosperity for all Lemesos residents.
    b. Innovation Spirit: Lemesos becomes a hub for green technologies and sustainable practices. This attracts forward-thinking businesses and nurtures an entrepreneurial spirit, driving economic innovation and diversification.
3. Environmental Benefits:
    a. Heat: The Climate City Contract combats the urban heat island effect in Lemesos. Green infrastructure projects, including urban parks and tree planting, reduce temperatures, making the city more livable, especially during hot summer months.
    b. Atmosphere: Lemesos sees an improvement in air quality as greenhouse gas emissions are reduced. This translates to cleaner and healthier urban environments, reducing the prevalence of respiratory illnesses and enhancing overall well-being.
    c. Cleanness: Climate initiatives, such as waste reduction and recycling programs, contribute to cleaner streets, beaches, and waterways in Lemesos. A cleaner city is not only more attractive to residents but also promotes a sustainable tourism industry.
4. Health Benefits:

   a. Well-being: The Climate City Contract directly impacts public health. Cleaner air and increased access to green spaces lead to improved mental and physical well-being among Lemesos residents, promoting a higher quality of life.
5. Governance Benefits:
   a. Innovation: Lemesos' commitment to the Climate City Contract necessitates innovative policies and governance structures. This fosters an environment of continuous improvement and adaptability, positioning the city as a pioneer in sustainable urban development.

3 Key priorities and strategic interventions

This is the core section of the Commitments document that should summarise **at least 3 or 4 systemic strategic priorities** that need to be implemented for your city to become climate neutral by 2030. These should be meaningful changes that will have a profound impact on reducing GHG emissions in your city, like decarbonising the heating system in the city or generating 100% energy from renewables. The individual commitments between your city and other stakeholders should address these key priorities and contribute to reaching them. The annexed 2030 Climate Neutrality Action Plan should describe the all interventions, including those to reach your priorities as well as all further actions, in detail and describe how your city plans to implement them.

Your text

In a world grappling with the urgent need to combat climate change, the city of Lemesos stands as a beacon of commitment and innovation. Lemesos, situated in Cyprus, has boldly declared its intention to achieve climate neutrality by the year 2030. This ambitious goal reflects not only the city's determination to curb greenhouse gas emissions but also its dedication to fostering sustainable development.

What distinguishes Lemesos' approach is its comprehensive strategy, which encompasses **Technical**, **Socia**l, and **Governance** interventions. These systemic priorities are pivotal in reducing emissions and laying the foundation for a sustainable, resilient future.

Achieving climate neutrality hinges on transforming Lemesos' technical infrastructure. Several key interventions form the backbone of this approach including the local production of energy, energy storage, urban regeneration, energy efficiency of buildings.

Taking a decisive step towards reducing its reliance on fossil fuels the city is embracing centralized energy production. In the CNAP it proposes harnessing the power of renewable sources such as solar to generate a substantial portion of its energy locally. This transition to cleaner energy sources not only reduces emissions but also enhances energy security and promotes local economic development. Additionally it proposes the creation of energy storage solutions that are essential to ensure a stable and resilient energy supply which will minimize waste and maximize the benefits of local renewable energy sources.

Beyond changing its energy production the city is proposes the implementation of policies and initiatives aimed at promoting responsible consumption. Circular economy models and sustainable transportation options are being encouraged, reducing unnecessary resource consumption and the associated emissions.

Lemesos is currently undertaking urban regeneration projects that have a dual impact. By redesigning urban spaces, increasing green areas, and creating pedestrian-friendly zones, the city aims to lower the need for energy-intensive cooling systems and promote eco-friendly transportation. This approach enhances both environmental sustainability and the quality of urban life.

Smart solutions for building energy efficiency are a priority. The city is adopting innovative technologies to reduce energy consumption in buildings, with a specific focus on optimizing cooling systems and implementing intelligent building management. This not only lowers emissions but also contributes to economic efficiency.

The city has set its sights on electrifying various sectors, from transportation to industry, while ensuring that the electricity comes from renewable sources. This bold move is expected to significantly reduce emissions associated with fossil fuel combustion, promoting a cleaner and more sustainable future.

To address emissions from the transportation sector, Lemesos is investing heavily in public transportation infrastructure. By making public transit more accessible, efficient, and appealing, the city aims to reduce the reliance on personal vehicles. This transition holds the promise of lowering emissions and easing traffic congestion.

Implementing a comprehensive waste separation system, with a specific focus on organic waste, is a key component of Lemesos' strategy. Additionally, the city is exploring the production of biofuels from organic waste, thereby reducing landfill dependency and emissions.

One of Lemesos' most remarkable initiatives is the creation of a unique climate action model with high transferability value. Reducing emissions from maritime activities is a priority for Lemesos, and it is actively encouraging the use of cold ironing for ships in its port. Collaborating with stakeholders, the city is working to provide the necessary infrastructure and incentives for this eco-friendly approach. This initiative not only drives climate-neutral transitions within the city but also serves as a model for other Mediterranean cities in Cyprus. It fosters regional collaboration and knowledge sharing, amplifying the impact of climate initiatives.

In addition to technical advancements, Lemesos places great importance on social interventions to ensure a just and inclusive transition.

Collaboration and inclusivity are at the heart of Lemesos' approach. Co-workshops bring together a diverse array of stakeholders who participate in generating climate solutions. This inclusive approach ensures a broad range of perspectives and expertise, enriching the decision-making process.

The Lemesos Commons is a dynamic platform that integrates solutions generated through co-workshops. It ensures representativeness and a holistic perspective by randomly selecting participants from various sectors. This structure maintains continuity and produces detailed project proposals with broad support.

Recognizing that all individuals and entities within the city contribute to emissions, Lemesos conducts comprehensive stakeholder mapping. This includes citizens, community organizations, residents, and civil society, ensuring inclusivity in decision-making processes.

Lemesos takes a geographic and social focus, prioritizing a just transition. The city's approach goes beyond results and emphasizes participatory decision-making to ensure that climate actions benefit all segments of society.

A dedicated entity, the Lemesos NZ 2030 Organisation, is responsible for driving the city's climate goals. It provides strategic leadership and coordination of climate initiatives, ensuring a unified approach.

Recognizing the importance of institutional capacity, Lemesos invests in building the capacity of its municipal institutions. This empowers them to effectively implement climate strategies and policies.

Expert teams, both internal and external, collaborate to develop and execute climate action plans. This collaborative approach ensures alignment with best practices and a well-rounded perspective.

The Transition Arena serves as a platform for all stakeholders to come together. It facilitates dialogue, knowledge sharing, and collective decision-making, fostering a collaborative climate action ecosystem with continuous sychnronous, asynchronous and repository online access to Information.

Transparent and accessible information-sharing platforms ensure that stakeholders have up-to-date information on climate initiatives, promoting accountability and informed decision-making.

Establishing two yearly regular physical forums provide opportunities for face-to-face engagement and collaboration among stakeholders, further strengthening the sense of community and shared responsibility.

Lemesos' unwavering commitment to achieving climate neutrality by 2030 is underpinned by a holistic approach that encompasses technical, social, and governance interventions. These systemic strategic priorities, combined with individual commitments and the detailed planning outlined in the Lemesos CNAP 2030, will undoubtedly pave the way for a sustainable and resilient future.

4 Principles and process

Highlight the key principles that will guide your city as it implements its Climate City Contract, like accountability, transparency, or an open attitude to new approaches. The process should encompass principles like **co-creation, innovation, multi-actor and citizen engagement,** and should be **systemic and demand-driven in nature.** It should also be based on **monitoring** and **joint learning**. The Commitments Guidance document provides more specific guidance on how integrate these principles into your own process.

Your text

4.1 Key principles

Our key principles are grouped in six axes (Figure CD 4.1): Sustainability, Geo-political, Scientific, Effective, Socioeconomic, and Participatory.

Under **Axis I Sustainability** the guiding principle is the *UN Sustainable Development Goals* and in particular SDG 13 (Climate Action), 10 (Reduced Inequalities), 11 (Sustainable Cities and Communities) and 12 (Responsible Consumption and Production). The litmus test is *Just Transition*: although it is obvious that the NetZero transition will have a large positive effect on the city, it is far from clear that this will be justly distributed; on the contrary several existing jobs and existing SMEs are in danger. (See the Introduction to the Action Plan, *Section 1.2.3 Guiding Principles for Project Priorities* for elaboration and examples.) *Transparency* increases participation and public trust and helps to self-restrain decision makers. *Accountability* is important for the large impact, both financial and physical, of decisions to be taken.

The **Geo-political Axis II** sets the broader context of the CCC: Policies, Laws, Directives and Regulations as well as social norms in the concentric circles of the *EU/EC/NZ Cities Mission*, the *Republic of Cyprus*, the living *Lemesos City* and the *Lemesos Municipality* define a context that must be adhered to while being reformed to serve the climate neutrality transition. A fundamental tool for this will be the Regulatory Sandboxes (see AP 1.4.3 – Three-year Plan (2023-2026) which increase the L.M. competence to design, advance and apply regulations that will give it more flexibility, greater enforcing powers and accelerating capacity on issues directly affecting the NZ Transition (e.g., building regulations, education and training, supply chains, traffic and others).

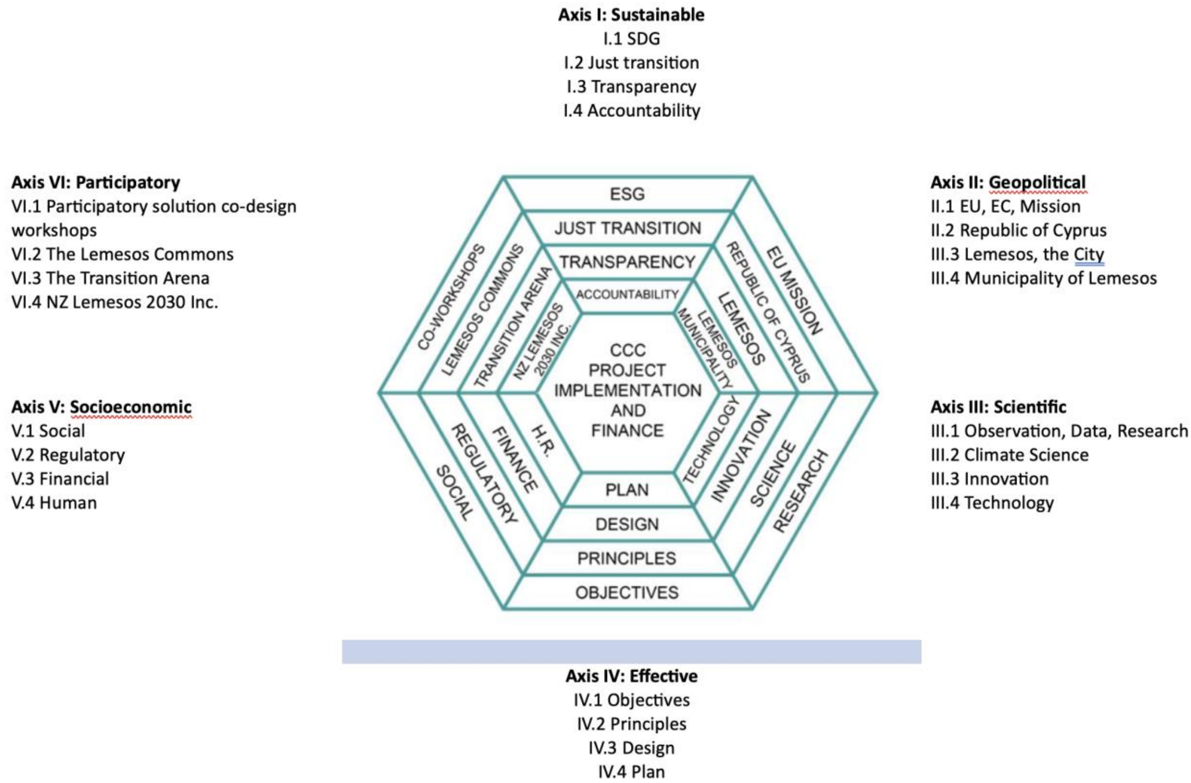

Figure CD 4.1: The six facets (key principles) of the Lemesos CCC implementation

Observing and monitoring (emissions, social attitude and behavior and the effects on these from the CCC actions), evaluating and learning from them; using the evolving *scientific research* on climate; *innovatively* applying mainly mature but at times experimental *technologies* constitute the **Scientific Axis III** which underpins the CCC (see impact pathways in the actions portfolio in the AP; in particular B-1.1.1 energy systems and B-1.1.2 Build environment Action 1 – Deep building retrofitting).

Effectiveness is the goal of **Axis IV.** It embodies the process of setting *objectives,* pursuing them with broadly agreed *principles*, doing iteratively careful participatory *design* (see Axis VI below) and *planning* before implementation.

Axis V includes action principles from the **Socioeconomic** context. Existing *socia*l attitudes toward climate change have been determined as a significant barrier to the Transition; shifting these attitudes along two directions (see Figure CD 4.2) from Needs to Citizenship and from adversarial to skillfully active are main goals of the CCC. The existing *regulatory* framework delineates -and constricts- our transition activities, including *financial* opportunities. Finally, we expect that sufficient *human resources* will be a significant bottleneck in the scaling up phase of the plan, especially regarding the built environment. For this, upscaling is foreseen as following the spiral growth process; beginning from a neighborhood portfolio of projects to reach a city scale transformation towards NZ (see "let 100 flowers bloom", the Social Innovation project, #4 in the 2023-26 plan, Introduction to the AP, Annex I).

We consider the **Participatory Axis VI** to be the most critical and at the same time the most innovative, so we describe the participatory solution co-design workshops and the Lemesos Commons in more detail here (For a fuller description see Sections 1.3.2, 1.3.3 and 1.3.4 of the Introduction to the Action Plan). Our *Transition Arena* consists of 5 transition teams: Internal Municipal, Scientific, Social, Political and Implementation. The *Lemesos NZ 2030 Inc.* is the central financing and implementation guiding organization, a multi-shareholder entity including citizens, SMEs, businesses, stakeholders, authorities and, of course, the Municipality.

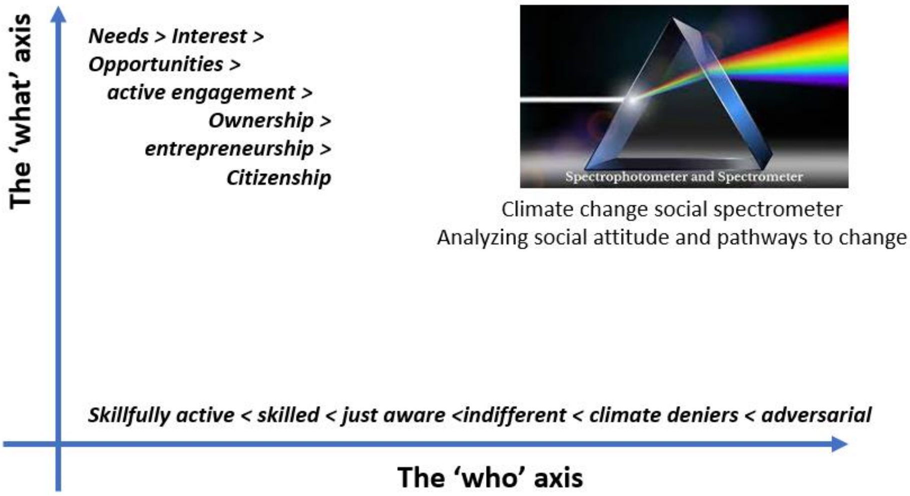

Figure CD 4.2: Climate change social spectrometer components

4.2 Participation: Citizens, Marginalized Groups and Stakeholders

Active and impactful involvement of the Stakeholders and the Public.

Despite the general agreement about informing and involving all stakeholders and citizens in City Climate Transitions, specific methods, objectives and therefore results differ. The Lemesos Transition master plan includes two main instruments: **Co-workshops** and the **Lemesos Commons**. Their main objectives are (a) to achieve a shift in social attitude towards people becoming agents of change in the climate crisis (CNCD Appendix III) and (b) distilling collective wisdom for the Transition. This wisdom will materialize in the form of transition-advancing detailed project proposals that are well thought-out, consider multiple stakeholder concerns, are solidly grounded on science, can be socially monitored, have broad support, and deal positively and objectively with objections. The two main instruments are being build according to the pilot project LC^3 (Lemesos City Cooling Challenge; 2023-2025).

4.2.1 Co-workshops: Participatory co-design solution workshops

Co-workshop methodology (protocol) has been developed in the pilot project LC3. A co-workshop is a transition-long effort by a team of 15-20 people from a single group of stakeholders (AP Intro Section 1.3.3) and is in this respect only homogeneous. It is organized around one or more face-to-face 3-hour sessions and includes initial group selection and preparation, subsequent synchronous and asynchronous online communication, and long-term team building. It is guided by a Transition-trained facilitator whose role is to organize, listen, conduct the face-to-face sessions, monitor the progress, evaluate the outcome, and transfer the learning to the whole Transition arena. Each workshop has a central theme, a specific issue for consideration and solution design. The sessions are interactive with well-designed activities and a self-reflection ending in each. Experts may join parts of the physical or online interaction, especially at the beginning and for answering feasibility questions and transferring experience from beyond Lemesos. The evolving concrete outcome of co-workshops is their co-designed solutions developed. The main expected impact is the change of attitude of the participants towards Climate Change, the Municipality and their personal and collective capacity to become change agents. Both outcome and impact of co-workshops are open (may change) and long-term. Is it expected that co-workshop participation will evolve in time with some new members joining and old leaving.

Evidence for co-workshops already implemented, co-workshops planned, and the methodology designed and being used see CNCD Appendix III.

4.2.2 The Lemesos Commons: from solutions to projects

Around 20 experienced co-workshop participants, randomly selected from various stakeholder co-workshops, will form a heterogeneous stakeholder group, the Lemesos Commons, to review, harmonize, and integrate solutions developed from the homogeneous co-workshops. (Analysing a problem first from one point of view by a homogeneous group and then from several points of view by a regrouped heterogeneous team is the well-known jigsaw method.) The reason for random selection is representativeness. Lemesos Commons members will commit their time for six months and then be replaced by other, also randomly selected, members from the same stakeholder group. (Each month 1/6th of Lemesos Commons members will be changed so that the change in membership is gradual.) The methodology for initial Lemesos Commons member preparation, physical sessions, synchronous and asynchronous online communication, progress monitoring, outcome evaluation, and transferring learning to the whole Transition arena is similar to those of the Co-workshops. An experienced member will act as the Lemesos Commons ‘Speaker' for 6 months, representing the Commons to the Transition team, the City Council, and the broader society. The outcome of the Lemesos Commons will be transition-advancing detailed project proposals that are well thought-out, consider multiple stakeholder concerns, are based on scientific expertise, can be socially monitored, have broad support and deal positively with objections. Its authority stems from its members' social recognition, their institutionalized participation in the governance/monitoring of Transition projects, participation in the City Transition team and the Lemesos NZC 2030 organization advisory board, but mainly it is their expert and referent authority that is important, so that although they have no formal veto power, their collective opinions will be respected.

4.2.3 Civic engagement: participation and challenges

Civic engagement is perhaps the major Transition action. Citizens are the main stakeholder and will be represented by random co-workshop "graduates" living/working in Lemesos, as economic actors (asset owners and users, professionals affected by or effecting the interventions), scientists and academics and political entities (government agencies and civil society). Co-design involves user engagement methods focused on collecting information from and empowering citizens to form a better understanding of their needs, through storytelling, workshops, and interactive design tools. The figure below (Fig. CD 4.3; from the pilot project LC^3) presents the approach that to establish the “Limassol Commons” towards the implementation of pilot projects, their upscaling process and MEL. All this work will be accompanied by dissemination at several levels (local, national, international) and MEL.

There are three challenges related to citizen engagement. First is getting a representative, fair, inclusive distribution of citizen groups to participate in the workshops in physical presence (not online); for the successful implementation of this, a thorough stakeholder mapping process has been conducted (see Section 5 of this CD, CNCD Appendix III for a list of workshops). Second is conducting the workshops so that they are actually participative co-design and not "presentation - questions - vote". Third is keeping citizens engaged afterwards, in the Lemesos Commons and the interventions. The difficulty (and the pitfall) is not to select those already interested, active and concerned by the Climate Crisis, else whatever success the Transition may initially have will not be scalable.

Details matter a lot: preparing the methodology and materials for the co-workshops; selecting and training the workshop facilitators (including issues on climate and psychology); running an effective CoΛ campaign inviting citizens; dealing with climate deniers, political opponents of the city administration, narrow-minded interests etc.; utilizing the presence of journalists and educators; and keeping people actively engaged for a long period. But, if we do manage these, the collective narrative will actually be owned by the citizens of Lemesos.

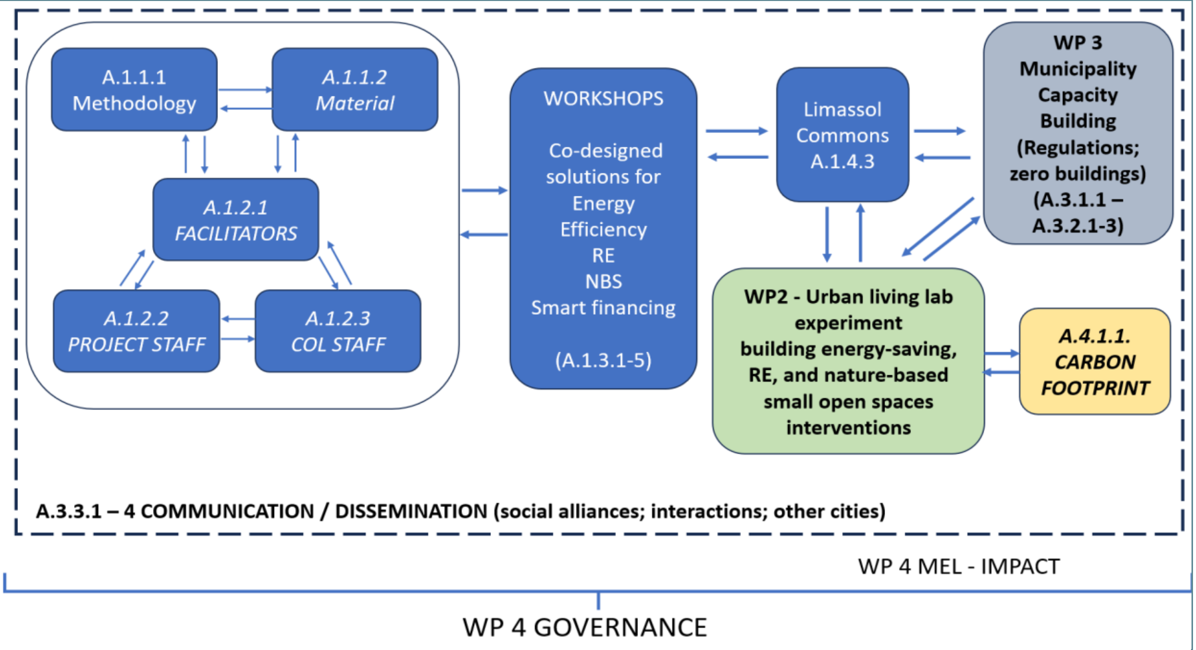

Figure CD 4.3. The approach that to establish the "Limassol Commons"

4.2.4 Socially marginalized groups

The most significant cross-cutting issue for CoL NZC is inclusion and support of the vulnerable and marginalized in four overlapping main aspects specific to the Climate Transition (and not necessarily identical with the 'usual' concept of socially marginalized):

(a) Legally non-citizen members of the society i.e., both poor migrants and rich foreigners who are usually excluded from the basic democratic participation. (b) The large minority who does not trust authorities (anti-vaccine, climate-deniers, conspiracy theorists, et.al) and is in principle against all top-down activities. (c) Low-income, low education, and elderly people, who by necessity regard emissions concerns as luxury beyond their means, who may not afford their share of the intervention costs and who may not directly benefit from them ("just transition"). (d) People who are afraid or realize that their jobs and SMEs are at risk (e.g., petrol/diesel car technicians). (e) A small Muslim (Turkish Cypriot) community.
(For more details including targeted creation of green jobs and inclusive SME business opportunities, see in the Introduction of the AP Sections 1.2.3 Guiding principles for project priorities and 1.3.2 Geographic and Social Focus.)

All five together may well be more than half the population (taking into account that more affluent citizens tend to live in the suburbs); outreaching to them for active involvement will be extra difficult. The communication campaign will target these diverse groups with a different strategy and means. This includes a particular role for unexpected stakeholders such as the Church, football clubs, and others. It is therefore important to exclude from the Transition efforts ideological issues other than those directly connected to Climate Neutrality -so far, the Municipality has been able to have unanimous cross-party consensus regarding the NZ Mission.

The Transition approach promotes and enhances the recognition and sharing of such efforts, the way they transform our local environments, gender and intersectionality (gender, race, background, and class) issues are on the agenda throughout the Transition and build on community wishes and challenges that emerge. Gender is less of a concern: women (e.g., mothers of young children) tend to be more active in environmental issues; we have to be careful though that they are not assigned lesser roles.

Age is a lever: we leverage the generation gap in understanding the risk of climate crisis and overcoming attitudes of helplessness, and selfishness.

The full just inclusive transition risks being beyond the scope of any specific project but is central for the Lemesos mission: short and medium-term benefits from, and problems by the road to NZ are not distributed equally or justly; it is easy for the urgency of the Climate Crisis to make us ignore this aspect. It is also important, especially for the scientists leading the effort, that it is not only the "objective" benefits and harms that have to be just; it is mainly the *perception and understanding of benefits and harms*.

Four specific points in the CCC evidence the results of our approach to include marginalized groups in the Action Plan development:

- The geographic focus (Intro to the AP, Section 1.3.2 Geographic and Social Focus) specifically includes a marginalized area in the 2023-26 initial planning period.
- The social focus (Intro to the AP, Section 1.3.2 Geographic and Social Focus) specifically includes the elderly and "*The pushed-away and left-behind (those who must benefit most from the Transition; vulnerable: affected by change, through various reasons unable to adapt without support)"* .
- The emphasis on early dealing with the risks of job loss and SMEs closing (Intro to the AP, Section 1.2.3, guiding principle number 2).
- A specific activity for early green job planning and specific courses designed and implemented in the Lc3 Pilot Project.

A major cross-cutting issue is getting people beyond their comfort zones and institutions beyond their quarterly reporting. Citizen onboarding, i.e., how to activate social groups, how to make them care about and how to enable them to act.

For marginalized groups, we will also capitalize on the work being conducted by the municipality and is related to social support programs (ongoing and planned). Indicatively, some of these include 1) The Social Market of the Limassol Municipality which was established in 2011 and supports vulnerable groups of citizens, mainly based on financial criteria. Its operation is based on the work of volunteers and is further supported by various organizations of the city and voluntary associations. 2) The "Free Hands" program, which is a project aiming to provide social support to low-income families by making sure that teenagers are kept safe during the afternoon. This way, mothers are given an opportunity to seek for a job and support their families. 3) The "Social Work on the Road" community intervention program runs for more than 10 years and focuses on young people, in vulnerable communities (e.g., low income, immigrants). 4) The "Odysseus" councelling station, a NGO offering prevention against behavioural and substance abuse. The program targets the general population, such as children, teenagers, young people, teachers and vulnerable population groups.

4.2.5 Stakeholder Participation

The process for Stakeholder participation is the following:

a. Stakeholder Mapping. Starting from Stakeholder types (Government, Authorities, Institutions, Businesses in several transition-related subcategories, SMEs, NGOs) we have drawn a long list of organizations, persons, involvement, present and expected roles in the Transition Arena.
b. Initial informal contact. The small size of Cyprus typically allows easy informal contacts at all levels. These give us the opportunity to talk to key persons (Mayors of the Cypriot NZ Cities network, Mayors of Metropolitan Lemesos, top administrative and engineering management of Cyprus Electric Authority, the Lemesos Bishop, bankers including EIB, SME representatives, Port Authority, etc) to explain the Mission, exchange oral and written information, and organize the next steps.
c. Formal contact and meeting with Municipality officers (including the Mayor, city councilors, the Town clerk, and members of the Internal Transition Team.
d. Participation in solution co-design workshop(s)
e. Singing a memorandum of understanding

f. Participation in drawing up the CCC. Includes suggestions, reviewing, writing specific sections, co-workshops.
g. Participation in the Lemesos Commons
h. Participation in Transition Projects. Includes initial requirements analysis, specification, design, procurement, and execution.

Needless to point out that this is an open, indicative process with several iterations. Its main characteristic is its openness and although at the beginning we were actively searching for stakeholders to participate at this stage we have more interest than we can timely, effectively, and wisely handle.

Section 5 and CNCD Appendix II, III have a partial list of stakeholders currently involved at various stages.

4.2.6 The Iterative, Agile Process of CCC Development

The transition process began with the establishment of a high-level guiding vision providing a clear and inspiring direction for its sustainability and climate resilience efforts, inviting stakeholders and citizens to engage in discussions and co-design the plan's implementation.

An iterative agile development approach for the Action Plan (AP) development ensures more citizens and stakeholders are continually involved, and ongoing refinement and responsiveness to evolving needs and ideas, primarily based on MEL. Designing the ActionPlan served as a catalyst for answering fundamental questions such as identifying barriers, recognizing opportunities, mapping stakeholders, and determining how to involve them effectively. This stage forced a comprehensive assessment of the sustainability landscape.

Thematic teams were established to address specific areas crucial for sustainability. These teams, in conjunction with public co-designed workshops, facilitated collaborative discussions and ideas-sharing. They played a pivotal role in shaping the Action Plan's content and direction. The present version of the Action Plan is described as the first complete version while emphasizing that it is not final or definitive, signaling a commitment to adaptability and openness to further refinement. The Action Plan serves as a foundation for discussions with the stakeholders and citizens and it represents a starting point for deliberation, refinement, and further engagement to shape the future updated versions.

In the period from October 2023 to March 2024, climate transition planning efforts in Lemesos will undergo a significant acceleration. This phase includes expanding the Transition Team and intensifying Municipal Capacity Building, with full-time staff dedicated to these efforts. The municipality will engage in extensive public consultation through co-workshops, leading to the development of the second version of the Climate City Contract (CCC). Feedback from CCC v1 will be incorporated into this updated version, and CCC v2 is scheduled for submission by March 15, 2024. This cycle of progress will be repeated in September 2024, emphasizing continuous improvement and adaptation in Lemesos' climate transition journey. Lemesos Municipality is dedicated to monitoring progress and fostering joint learning. This commitment is highlighted by its plan to establish a CCC Monitoring, Evaluation, and Learning (MEL) mechanism, which will provide a structured framework for assessing the effectiveness of sustainability initiatives, ensuring that the vision of an inclusive and sustainable Lemesos is realized. Given the strong political support for the vision, scientists are engaged to design specific actions for discussion. The city partnered with the Cyprus Institute (CyI) as its central scientific advisor and collaborates with three additional universities specializing in particular thematic areas. These institutions produced an initial version of action portfolios based on their expertise and gathered input through public workshops involving stakeholders and citizens. Co-creation is a core principle that resonates throughout Lemesos Municipality's engagement with stakeholders, citizens, and thematic teams. It recognizes that sustainable solutions require input from diverse stakeholders, including marginalized groups, and promotes collaboration to design and execute effective strategies that leave no one behind. In parallel, the Lemesos Municipality embarked on developing an Investment Plan for its climate neutrality goals. With the aid of financial advisors, the Action Plan was analyzed, the capital sources identified, and the 2023 budget assessed. Stakeholder mapping and capacity assessments paved the way for the IP stakeholder communication. The relevant parties considered the municipality's capital stock, estimated capital needs, and addressed associated risks. They established a monitoring, evaluation, and learning (MEL) framework for feedback.

The Investment Plan, divided into three sections, encompasses climate investment's current state, pathways to neutrality, and enabling conditions. This comprehensive strategy showcases the Municipality's commitment to mobilizing resources, participatory approaches, and stakeholder engagement in the fight against climate change effectively.

4.3 Governance

Broad citizen and stakeholder involvement does not stop at active participation in the AP development process; it is also important that they continue participating in the implementation process (see Figure CD 4.4). A significant risk in such long-term social reform processes is social opposition at mid-term which when reflected in changes in the political leadership lead to the curtailing or even abandonment of the endeavor. (Examples: the US pulling out of the Paris Agreement; the Sevilla city after the 2023 elections changing some of their climate commitments; the UK government during 2022-23 reducing their climate goals.) This is why the benefits of the process of Transition (not just its results) should be monotonically increasing for all (see Intro to the AP Section 1.2.3 for details.)

The Lemesos CCC plan ensures broad social participation in its governance through a multi-shareholder organization “NZ Lemesos 2030, Inc” that controls project procurement, finance, monitoring and acceptance.

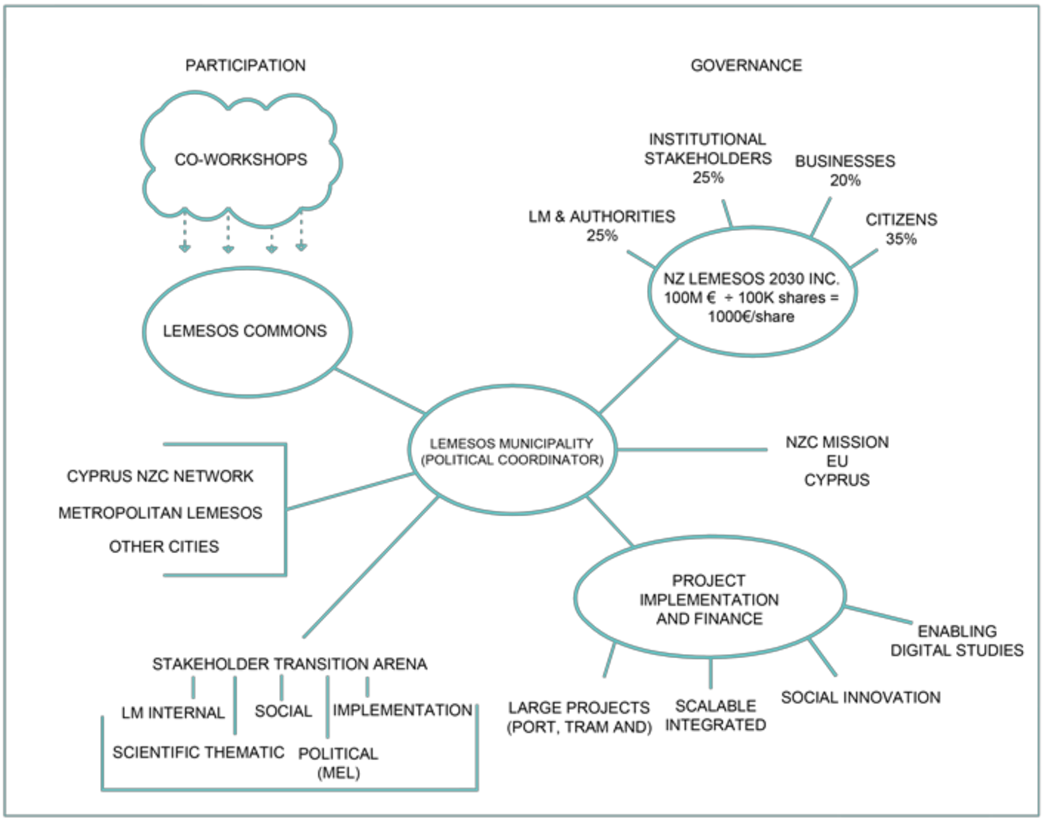

Figure CD 4.4. Governance, stakeholder engagement for projects implementation for NZ Lemesos 2030

Lemesos Municipality's sustainability journey is deeply rooted in a vision that encompasses a robust commitment to key principles guided by the creation of the Lemesos' Climate City Contract. These principles encompass accountability, transparency, an open attitude towards innovative approaches, co-creation, multi-actor and citizen engagement, systemic thinking, demand-driven initiatives, and a strong foundation in monitoring and joint learning.

The process begins with the establishment of a vision that serves as a guiding light throughout this journey, providing a clear and inspiring direction for its sustainability and climate resilience efforts, inviting stakeholders and citizens to engage in discussions and co-design the plan's implementation. This approach emphasizes the importance of aligning the plan with a clear and shared vision for sustainability. An iterative and agile development approach is employed throughout the Action Plan (AP) development process. As the AP is being developed, more citizens and stakeholders are continually involved, ensuring ongoing refinement and responsiveness to evolving needs and ideas.

Designing the ActionPlan served as a catalyst for answering fundamental questions such as identifying barriers, recognizing opportunities, defining stakeholders, and determining how to involve them effectively. This stage forced a comprehensive assessment of the sustainability landscape. Thematic teams were established to address specific areas crucial for sustainability. These teams, in conjunction with public co-designed workshops, facilitated collaborative discussions and idea-sharing. They played a pivotal role in shaping the Action Plan's content and direction.

The present version of the Action Plan is described as the first complete version. However, it is emphasized that it is not final or definitive, signaling a commitment to adaptability and openness to further refinement. The Action Plan serves as a foundation for discussions with the stakeholders and citizens and it represents a starting point for deliberation, refinement, and further engagement to shape the future updated versions.

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The Investment Plan, divided into three sections, encompasses climate investment's current state, pathways to neutrality, and enabling conditions. This comprehensive strategy showcases the Municipality's commitment to mobilizing resources, participatory approaches, and stakeholder engagement in the fight against climate change effectively.

5 Contract with signatures, agreements and support

Include a list of stakeholders who have committed to help your city achieve its goal to reach climate neutrality by 2030. Detailed commitments and agreements between individuals or groups of stakeholders should be appended to this Commitments document. This list will likely increase over time.

<table>
<tr><th></th><th>Name of the institution</th><th>Sector/Area</th><th>Legal form</th><th>Name of the responsible person</th><th>Position of the responsible person</th></tr>
<tr><td></td><td>President of the Republic of Cyprus</td><td></td><td>National Government</td><td>Nicos Christodoulides</td><td>President</td></tr>
<tr><td>Commitments</td><td colspan="5">• Aligns national goals with the green goals of the European Commission.
• Works with the Limassol Municipality for the planning and implementation of holistic policies to utilize European tools and funds.</td></tr>
<tr><td>Aspect of Commitment</td><td colspan="5">☒ Formal oral public declaration of support
☐ Participated in drawing up the CCC
☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030
☐ Signed the CCC
☐ Climate friendly business activities.</td></tr>
<tr><td>Annex No.</td><td colspan="5"></td></tr>
<tr><td>Website link</td><td colspan="5"></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td></td><td>Directorate General of Development</td><td>• Coordinates EU Green Deal Strategy implementation.
• Leads Sustainable Development Goals 2030 framework.
• Drives competitiveness and productivity reforms.</td><td>National Government</td><td>Georgia Christofidou

Eleftherios Eleftheriou

Marios Theofilou</td><td>Director</td></tr>
</table>

		• Manages the National Reform Program. • Coordinates commitments within European Semester. • Prioritizes Cyprus Government requests for EU Commission's DG Reorm assistance.			
Commitments	• Provides key information from NECP funds and collaborate with relevant services for smoother fund allocation. • Integrates the Climate City Contract the National Energy and Climate Plan (NECP). • Estimates and provides with the Department of the Environment the city's current emissions. • Collects all green projects funded by Europe/National sources, along with new Contract projects, will contribute to reduction estimates. • Regulatory exemptions (Regulatory Sandboxes) will be explored for the creation of an energy community proposal for Limassol Marina will be evaluated by the Energy Agency and an exception for camera surveillance in the "low emissions zone" will be considered. • Updates the Municipality on Green Deal Governance System progress via Technical Committees.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	[Directorate for Sustainable Development | Directorate General Growth, Ministry of Finance | (mof.gov.cy)]				
Annex No.					
	Deputy Ministry to the President		National Government	Irene Pikki	Deputy Minister

	Ministry of Agriculture/ Department of Environment		National Government	Nikoletta Kythreotou	Officer
Commitments	• Incorporates the CCC in the NECP • Provides data of emissions to the Municipality • Co-creates proposals for the waste management of the Municipality				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	Ministry of Transport/ Department Public Works		National Government	Alexis Vafeades Evie Anayiotou	Minister of transport, communications and works Senior Executive Engineer at Public Works Department
Commitments	• Planning for the protection of public health, the reduction of the effects of climate change, of noise and air pollution. • Development of all transport means with the simultaneous development of alternative modes of transport. • Implementation of Limassol Sump.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	Ministry of Transport, Communications and Works | (mtcw.gov.cy) Sustainable Mobility – Sustainable Cyprus				
Annex No.					

	Deputy Ministry of Innovation and Research		National Government	Phillippos Hadjizacharias Eleni Poulli	Deputy Minister
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities				
Website link	Deputy Ministry of Research, Innovation and Digital Policy | Deputy Ministry of Research, Innovation and Digital Policy (dmrid.gov.cy)				
Annex No.					
	Deputy Ministry of Shipping		National Government	Marina Hadjimanolis Stelios Chimonas	Deputy Minister
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities				
Website link	Deputy Ministry | Shipping Deputy Ministry (dms.gov.cy)				
Annex No.					
	Environmental Commisioner		National Government	Maria Panayiotou	Commissionner
Commitments	• Participates in the co-design of activities for the development of Green Carnival Limassol 2030 • Participates in the co-design of the Green Theatre Strategy				

<table>
<tr><td>Aspect of Commitment</td><td colspan="5">☒ Formal oral public declaration of support
☐ Participated in drawing up the CCC
☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030
☐ Signed the CCC
☒ Climate friendly business activities.</td></tr>
<tr><td>Website link</td><td colspan="5">Επίτροπος Περιβάλλοντος (environmentalcommissioner.gov.cy)</td></tr>
<tr><td>Annex No.</td><td colspan="5"></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td></td><td>Strovolos Municipality</td><td rowspan="3">Limassol Municipality forms Network with municipalities that applied to join Mission Cities but were not selected.</td><td rowspan="3">Network of Local Authorities</td><td>Andreas Papacharalambous</td><td>Mayor</td></tr>
<tr><td></td><td>Pafos Municipality</td><td>Phedonas Phedonos</td><td>Mayor</td></tr>
<tr><td></td><td>Aradippou Municipality</td><td>Evangelos Evangelides</td><td>Mayor</td></tr>
<tr><td>Commitments</td><td colspan="5">• Establish cooperative relationship
• Exchange and implement good practices and know-how
• Planning and implementing joint projects to promote the transition towards climate neutrality and digital transformation</td></tr>
<tr><td>Aspect of Commitment</td><td colspan="5">☒ Formal oral public declaration of support
☐ Participated in drawing up the CCC
☒ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030
☐ Signed the CCC
☒ Climate friendly business activities.</td></tr>
<tr><td>Website link</td><td colspan="5"></td></tr>
<tr><td>Annex No.</td><td colspan="5"></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td></td><td>Municipality of Athens</td><td rowspan="2">Limassol Municipality forms Network with municipalities from Greece that were</td><td rowspan="2">Network of Local Authorities</td><td></td><td>Mayor</td></tr>
<tr><td></td><td>Municipality of Thessaloniki</td><td>Michail Koupkas</td><td>Deputy Mayor</td></tr>
</table>

	Municipality of Ioannina	selected as Mission Cities.		Dimitrios Papageorgiou	Mayor
	Municipality of Kalamata			Athanasios Vasilopoulos	Mayor
	Municipality of Kozanh			Lazaros Maloutas	Mayor
	Municipality of Trikala			Nikolaos Sakkas	Mayor
Commitments	• Prepares proposal for: - The adoption of a Special Procurement Regulation for projects - programmes that are the subject of the Programme "100 Climate Neutral and Smart Cities by 2030", with a timeframe of implementation until 2030. - The promotion of guidelines for premiums – financial support for businesses, especially small and medium-sized enterprises (SMEs) located within the pilot cities. - The development of ESG standards for businesses located within pilot cities - The communication and dissemination of a specific criterion for environmental action plans in parallel and in compatibility with the CCC - The creation of a municipal "ESG back office" to support SMEs in integrating ESG principles within pilot cities				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☒ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	Municipality of Cluj-Napoca Technical University of Cluj-Napoca	Limassol Municipality forms Network with municipalities that were selected Mission Cities and have Universities that belong to EuT (European	Network of Local Authorities and Academia	Emil Boc	Mayor
	Municipality of Dublin Technological University Dublin			Caroline Conroy	Lord Mayor

	Municipality of Riga Riga Technical University	University of Technology)		Mārtiņš Staķis	Mayor
	Municipality of Sofia Technical University of Sofia			Yordaka Fandakova	Mayor
Commitments	• Collaborate towards the development of a direct cultural, urban and scientific cooperation for the EU Mission: Climate Neutral and Smart Cities by 2030				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☒ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	• CYPRUS UNIVERSITY OF TECHNOLOGY		Academia/ Research	Ioannis Vyrides Alexandros Charalambides Antonis Papantoniou	Phd Student
	• ERATOSTHENES CENTRE OF EXCELLENCE			Eleni Loulli Marios Tzouvaras	Researcher C
	• FREDERICK UNIVERSITY			Angelos Menelaou Alexis Onoufriou Byron Ioannou	
	• NEAPOLIS UNIVERSITY			Martha Katafygiotou	
	• THE CYPRUS INSTITUTE			Costas Papanicolas Konstantinos Kleovoulou Thanasis Hadjilacos Vasilis Litskas Christiana Katti Michael Papadopoulos	

	• UNIVERSITY OF CYPRUS			Loucas Dimitriou Christos Gkartzonikas	
	• UNIVERSITY OF NICOSIA				
Commitments	• Propose actions that their implementation leads to pre-set goal of Climate Neutrality. (CNAP) • Monitoring. • Assess indicators. • Evaluate. • Redesign CNAP. • Preparation and distribution of questionnaires.				
Aspect of Commitment	☒ Formal oral public declaration of support ☒ Participated in drawing up the CCC ☒ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	Limassol Chamber Of Commerce & Industry			Tsouloftas Andreas	CEO
Commitments	• Co-creates stakeholder engagement workshops. • Belongs to the Board of Directors of the Lemesos NZ 2030 Organization				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	ETAIREIA METAFORAS EPIBATON			Georgios Kyriakou Petros	CEO

	LEMESOU (EMEL) LTD			Christos	
Commitments	• Provides buses, bus drivers and the service needed for the demonstration in agreed projects and activities. • Updates telematics and connectivity platform in order to advance as a whole the PT offering				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	[EMEL LTD – Limassol Buses]()				
Annex No.					
	Moby Sustainability Non For Profit ILtd			Maria Kamargianni	
Commitments	• Monitors and manages activities, innovation, data management strategies, ethics, and standardisation of mobility projects.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	[About Us - MobyX - Transport software solutions]()				
Annex No.					
	Deloitte Touche Tohmatsu Limited			Kyriakos Charalambides Marina Papadopoulou	Partner
Commitments	• Supervises the preparation of the CNIP (Climate Neutrality Investment Plan). • Monitors the implementations and allocation of funds. • Participates in the co-design of a strategy for the Municipality to manage funds.				
Aspect of Commitment	☒ Formal oral public declaration of support ☒ Participated in drawing up the CCC				

	☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	Limassol | Deloitte Middle East | Office locator				
Annex No.					
	Lemesos 2030 Ltd			Eleana Alexandrou	Director
Commitments	• Co-designs citizen engagement workshops. • Co-creates NZ interventions in existing cultural buildings and open air spaces. • Co-creates Green Theatre activities.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	Green Dot Ltd			Vassilis Petrides Erato	President
Commitments	• Achieving recovery and recycling goals. • The cultivation of right values and habits.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	Home - Green Dot Cyprus				

Annex No.					
	Nextbike CY Ltd			Neophytos Ioannou	CEO
Commitments	• Installs docking stations for e-bikes. • Advances their platform and app.				
Aspect of Commitment	☒ Formal oral public declaration of support ☒ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	[nextbike – Cyprus]()				
Annex No.					
	Agno Zero Waste Store			Dimitrios Michaelides	CEO
Commitments	• The cultivation of right values and habits.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	[nextbike – Cyprus]()				
Annex No.					
	The Heart Group			Stylianos Lambrou	President
Commitments	• Invests private funds into deep retrofitting existing buildings. • Invests private funds into the development of net zero emissions buildings.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC				

<table>
<tr><td></td><td colspan="5">☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030
☐ Signed the CCC
☒ Climate friendly business activities.</td></tr>
<tr><td>Website link</td><td colspan="5">About - Heart Group (theheart.group)</td></tr>
<tr><td>Annex No.</td><td colspan="5"></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td></td><td>Oxygono.org</td><td>• Provides a platform for diverse viewpoints
• Focuses on improving democratic processes.
• Country Coordinator for EU Pact in Cyprus.</td><td>Oxygono is a nonprofit organization founded in 2014 in Cyprus. Its goal is to enhance transparent and science-based policymaking by fostering participation. It's independent, guided by a board of directors and executive committee.</td><td>Nicolas Kyriakides

George Isaia</td><td>Vice-President

Operations Executive</td></tr>
<tr><td>Commitments</td><td colspan="5">• Co-organizes with the Limassol Municipality Cyprus Forum Cities the largest municipal gathering in Cyprus:
- Hosts panels representing various regions, involving experts from politics, academia, and civil society
- Shapes long-term urban and rural development plans
- Empowers municipalities with innovative approaches
- Enhances the relationship between local government and citizens
- Summarizes in a report the progress local authorities regarding their sustainable urban development.

• Organizes the yearly Cyprus Forum during which discussions regarding public policy matters arise:
- Seeks positive change
- Influences agendas
- Promotes sustainable policies in Cyprus and the wider Eastern Mediterranean region

In Cyprus Forum 2023 the Limassol Municipality curates a panel in the subject of Regulatory Sandboxes and their implementation in Cyprus</td></tr>
</table>

<table>
<tr><td></td><td colspan="5">• Collaborates with the Municipality in projects:
- Is responsible for organizing metadesign activities
- Engages citizens and stakeholders
- Disseminates projects locally</td></tr>
<tr><td>Aspect of Commitment</td><td colspan="5">☒ Formal oral public declaration of support
☒ Participated in drawing up the CCC
☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030
☐ Signed the CCC
☒ Climate friendly business activities.</td></tr>
<tr><td>Website link</td><td colspan="5">https://oxygono.org/en/</td></tr>
<tr><td>Annex No.</td><td colspan="5">The report for Cyprus Forum Cities becomes part of the CCC.</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td></td><td>Friends of the Earth</td><td>Friends of the Earth Cyprus (FoE Cyprus) is committed to advocating for environmental preservation and social solutions through sustainable policies. Guided by values like ecological diversity, environmental protection, justice, gender equality, and the intrinsic value of nature, they envision a future of environmental and social justice, sustainability, and the nurturing of</td><td>Friends of the Earth Cyprus (FoE Cyprus) is a non-governmental, non-profit organization founded in 1993 and headquartered in Limassol, Cyprus. It holds registered association and charity status in the Republic of Cyprus. FoE Cyprus is affiliated with various environmental networks, including Friends</td><td>Anastasia Korae

Sara Mariza Vryonidi

Natasa Ioannou</td><td>President

Project Manager

Project Manager Energy Campaign</td></tr>
</table>

		diverse cultures and ecosystems.	of the Earth International, Friends of the Earth Europe, European Environmental Bureau, Zero Waste Europe, and Break Free from Plastic. Currently, the organization boasts approximately 450 members who support its environmental advocacy and conservation efforts.		
Commitments	FoE Cyprus participates with the Limassol Municipality in citizen engagement. They are part of the Consortium for the Pilot City Project – LC3.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	WHO WE ARE – Friends of the Earth Cyprus (foecyprus.org)				
Annex No.					
	Terra Cypria		NGO		
Commitments	• Co-designs with the Limassol Municipality questionnaires • Prepares educational material and student engagement opportunities.				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC				

<table>
<tr><td></td><td colspan="5">☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030
☐ Signed the CCC
☒ Climate friendly business activities</td></tr>
<tr><td>Website link</td><td colspan="5">Terra Cypria – Terra Cypria</td></tr>
<tr><td>Annex No.</td><td colspan="5"></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td></td><td>The Cyprus Energy Agency</td><td>• Empowers local authorities in sustainable energy planning.
• Offers technical assistance for climate change strategies.
• Supports Covenant of Mayors for Climate & Energy.
• Envisions inclusive, climate-resilient Cyprus guided by sustainability.</td><td>The Cyprus Energy Agency (CEA) is an autonomous, non-governmental, and not-for-profit entity.</td><td>Savvas Vlachos

Charis Kordatos

Myrto Skouroupathi</td><td>Director

Head of Climate Change & Environment Department - Climate Change & Environment Expert

Environmental Engineer & Project Manager</td></tr>
<tr><td>Commitments</td><td colspan="5">The CEA is updating the BEI 2009-2021 based on Covenant of Mayors methodology. They are participating in the development of a local strategy to achieve climate neutrality.
They are assessing climate risks and vulnerabilities in the Limassol municipality and are participating in the preparation of a revised plan for sustainable energy and climate action, following a participatory process with the local citizens/ stakeholders.
They are preparing a detailed emissions analysis based on EU Mission Guide.

The participation in the EU Mission: Limassol 2030 commenced in March 2023. Their work has been added in the NACP and will continuously be added until 2030.</td></tr>
<tr><td>Aspect of Commitment</td><td colspan="5">☒ Formal oral public declaration of support
☒ Participated in drawing up the CCC
☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030</td></tr>
</table>

	☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	[Home | (cea.org.cy)]()				
Annex No.					
	CITY FRIENDS CLUB	• Educates on waste reduction and mindful waste practices. • Promotes creative reuse. • Behavior change through workshops, waste audits, and campaigns. • Partner with local businesses for eco-friendly solutions. • Community Engagement • Offer cooking classes, art projects, and online resources. • Cultivate a waste-conscious culture. • Transform Cyprus into a sustainable community.		Anna Gubareva Natalia Mutovkina Daria Denisova Marios Polymniou	Founder Operational Director Marketing Manager Project Manager
Commitments	CFC organizes with the Limassol Municipality events aiming to encourage participation from residents to share innovative ideas aimed at transforming Limassol into a smart city by 2030. The events feature a panel discussions and participants have the opportunity to collaborate and win exciting prizes, fostering community engagement and a collective drive towards a smarter and more sustainable city.				

Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link	https://cityfriends.club/				
Annex No.					
	CSTI		NGO	Philippos Drousiotis Antje Papageorgiou	Executive Chairman Board Member
Commitments	To promote the development of sustainable approach to tourism in Cyprus through: • Sensible preservation, conservation and protection of the environment and the prudent use of natural resources; • Reduction of the impact of our carbon footprint as a result of all our activities related to tourism; • Improvement of the conditions of life in socially and economically disadvantage communities due to tourism; • Promotion of sustainable means of achieving economic growth and regeneration; • Research and education				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	Junior Achievement	Junior Achievement Cyprus is part of the global Junior Achievement Worldwide, dedicated to empowering youth		Antigoni Komodiki	CEO

		for economic success.			
Commitments	• Incorporates the Mission Limassol 2030 goal in their programs like the Company Programme to high school students, impacting about 15,000 annually • Research and education				
Aspect of Commitment	☒ Formal oral public declaration of support ☐ Participated in drawing up the CCC ☐ Signed Memorandum of Collaboration for the Transition of Lemesos to NZ by 2030 ☐ Signed the CCC ☒ Climate friendly business activities.				
Website link					
Annex No.					
	EAC (Electricity Authority of Cyprus)		Semi-private/ Public Company	Adonis Yiasemidis Thasos Theodoulou	General Director Director Limassol Branch
Commitments	• Implement actions that relate to energy production, storage, distribution. • Monitor. • Assess. • Evaluate.				
Website link	[EAC - Κεντρική σελίδα]				
Annex No.					

LIST OF STAKEHOLDERS THAT ATTENDED WORKSHOPS AND PROVIDED DATA/ FEEDBACK/ CRITISM/ TIME			
	Name of the institution	**Name of the responsible person**	**Position of the responsible person**
Stakeholder list	Cyprus Organization for Standardization The Cyprus Chamber of Commerce and Industry Friends of the Earth Green Dot Cyprus	Marios Mavrogiannos Christos Anastasiadis Mariza Vryonidi Erato Papageorgiou	

	Aglantzia Municipality Technological University of Cyprus Cyprus Scientific and Technical Chamber Limassol Municipality Limassol Events Energy Office City Friends Club agno grocery Cyprus Employers & Industrialists Federation Private individual ideopsis Petousis Company E.M.C. Netwall RRC	Dimitra Katechaki Stalo Georgiadou Georgios Oikonomidis Marlen Vaskes Michalis Michael Kyriakos Kavkalias Giannis Kakullis Andreas Christoforou Savvas Theodoulou Michalis Koutinas Stefani Dimitriou Marios Polymniou Dimitris Michaelidis Fanos Panagi Andri Dimitriadou Vasileia Chrysostomou Chryso Sotiriou Andreas Dionysiou Chris Petousis Panagiota Petousi Antonia Christou Savvas Konstantinou Thessalia Nikolaou Kostas Papas	
Woskshop date	13/02/2023		
Brief			
	Name of the institution	**Name of the responsible person**	**Position of the responsible person**
	RRC Department of Urban Planning Neapolis University RRC Limassol Municipality Neapolis University The Cyprus Institute	Kostas Papas Vladimiros Zavros Martha Kataphygiotou Thessalia Nicolaou Katerina Loukaidou Konstantinos Vasileiadis Nestoras Fylaktos Georgios Artopoulos	Urban Planner Urban Planning Officer Lecturer at NUP Environmentalist Civil Engineer Assistant Professor Academic Technical Officer

	The Cyprus Institute Limassol Municipality The Cyprus Institute Frederick University Frederick University Movement of Architects of Limassol Frederick University Movement of Architects of Limassol ETEK (Cyprus Scientific and Technical Chamber) ETEK (Cyprus Scientific and Technical Chamber) Frederick University Terra Cypria Terra Cypria University of Cyprus Department of Environment Ministry of Energy A/F Petousi Brothers CUT Cyprus Institute	Euelyn Eudorou Despona Sergidou Lora Nikolaou Byron Ioannou Stelios Michailidis Nasia Nalmatidi Stelios Lakkotrypis Themis Themistocleous Dinos Nicolaides Carol Bailey Andrea Panayiotou Christoforos Panayiotou Marina Panayiotou Dimitris Psyllidis Nikos Chatzinikolaou Chrysis Petousis Andreas Dionysiou Maria Karmelli	Professor Professor Associate Professor Architect Research Coordinator Architect Architect, ETEK Member Mechanical Engineer Researcher Climate Change Officer Policy Manager Environmental Officer Officer Executive Director Environmental Office Postdoctoral Researcher
Woskshop date	14/02/2023		
Brief			
	Name of the institution	**Name of the responsible person**	**Position of the responsible person**
Stakeholder list	CEA EAC CEV Friends of the Earth Terra Cypria MPEC Atlantean Energy	Myrto Skouroupathi Alexis Violaris Marcus Hirsch Sara Maria Vryonidi Andrea Panagiotou Michalis Pakkos George Trantidis	

	Terra Cypria ETEK Ministry of Energy	Orestis Kargiotis Dinos Nicolaides George Partasides	
Woskshop date	14/02/2023		
Brief			
	Name of the institution	**Name of the responsible person**	**Position of the responsible person**
	University of Cyprus CUT University of Cyprus General Secretariat for Civil Protection University of Cyprus RRC Legal Researcher Department of Forests Terra Cyprus Association Frederick University Cyprus Organization for Small & Medium Sized Enterprises Eratosthenes Centre of Excellence University of Cyprus Terra Cypria University of Cyprus RRC Cyprus Scientific and Technical Chamber Ecologists Nextlive Urban Planning Terra Cypria Police Frederick University	Christos Gartzonikas Andreas Dionysiou Kyriakos Moustakas Petros Mouzouridis Kostas Papas Stalo Georgiadou Anastasia Koraee Orestis Kargiotis Kyriakos Mouskos Niki Chatzilira Byron Ioannou Giannis Kakullis Marios Tzouviras Lucas Dimitriou Andreas Panayiotou George Alexandrou Thessalia Nicolaou Michalis Lambrinos Angie Papageorgiou Neofytos Ioannou Vladimiros Christoforos Panayiotou Evagoras Nikolaides Dimitris Psyllidis Charalambos Menelaou Dimitris Chatzizorzis Carol Bailey	University of Cyprus Department of Urban Planning Office of the General Secretariat for Civil Protection University of Cyprus Urban Planner President Climate Change Officer Transportation Planner Architect Frederick University Coordinator Coordinator Assistant Professor Climate Change Officer Researcher Environmentalist Transportation Planner Nextbike Urban Planning Officer Technical Director Policy Manager Road Safety Manager Environmental Officer Research Engineer Research

Woskshop date	15/02/2023		
Brief			
	Name of the institution	**Name of the responsible person**	**Position of the responsible person**
	Frederick Frederick Limassol Marina Cyprus Ports Authority (CPA) Frederick Department of Fisheries Marine Environmental Sector Frederick Technological University of Cyprus (TEPAK) TEPAK (Technological University of Cyprus) DP World Limassol Limassol Marina CMMI (Capability Maturity Model Integration) Ministry of Shipping (Υφυπουργείο Ναυτιλίας) Eurogate Frederick University & Marine Environment Research Center (FU & MER) RRC RRC Cyprus Shipping Deputy Ministry -	Angelos Menelaou Markos Karamontanis Nasia Nalbanti Gregory Kalnis Andreas Mouyseos George Economides Katerina Dokou Michalis Menoikou Vasilis Papadopoulos George Dimitriou Thalis Zis Sotiris Meletiou Doros Aresti Tom Lord Louis Chatziioannou Nicolas Ioannou Petros Dias Dimitris Kleitou Stalo Georgiadou Thessalia Nicolaou Kostas Papas Dimitris (Last name not provided) Eugen (Last name not provided) Chrysostomos Efthymiou	Frederick EDNAS Research Coordinator Research Staff Technical & Property Manager Environmental Officer Associate Professor Supervisor/Manager Associate Professor Assistant Professor Research Assistant Assistant Manager Marina Manager Associate Researcher Officer HSSE (Health, Safety, Security, and Environment) Manager Director Environmentalist Urban Planner General Director Chairman Marketing Officer

	Climate Smart Shipping Alliance (ΣΑΠΚ CSA) CY - FOS CSC (Customer Service Center)		
Woskshop date			
Brief			
	Name of the institution	**Name of the responsible person**	**Position of the responsible person**
Stakeholder list	Frederick University	Savvas Christou Pavlos Fouli Andreas Antoniou Dimitra Kafousi Maria - Christina Kalakouti Maria Loizou Stefania Karagianni Sotia Liasidou Eleni Ermogenous Kyriaki Kapnistou Andreas Antoniou (again) Andreas Toumazou Antonios Papakonstantinou Raphaela Theodorou Michaelia Andreou Eugenia Papapanaretou Hero Vasilaki Marilena Parthenidou Christos Vlachogiannis Lora Nikolaou Angeliki Kassianou Elena Polykarpou Elli Miza Raphael Pelengaris Tereza Vavrova Marketa Kaderabkova Andri Papaka	University Student University Teacher University Student University Student University Student University Teacher University Student

Woskshop date	07-08/04/2023		
Brief			
	Name of the institution	**Name of the responsible person**	**Position of the responsible person**
		Patrick Child Apostolos Tzitzikostas Harald Sonderegger Bob D'Haeseleer Konstantinos Kleovoulou Chrysses Nicolaides Katerina Yennari Nikos Christodoulides Annita Demetriou Andreas Vyras Lefteris Perikli Nicolas Kyriakides Panayiotis Zaphiris Nicos Nicolaides Sakis Stylianou Nikos ISARIS Keynote Speech Constantinos Yiorkadjis Myrto Zoumidou Anthi Charalambous Nasia Dikigoropoulou Andreas Constantinou Dimitrios Michailidis Volker Ludwig Theodoros Zachariadis Apostolos Bizakis Claudio Minelli Nikolaos G. Felessakis Euridice (Evie) Anayiotou Byron Ioannou Nasos Kolyvas Neofytos Ioannou Maria Kamargianni Aresteia Aspridou	

		Jason Sennekis Despina Serghides Nicos Hadjinicolaou Marios Papanicolaou Evangelos Evangelides Panayiotis Papadopoullos Eleni Iacovidou Alexandros Charalambides Captain Eugen-Henning Adami Tom Lord Natalia Bury Loyal Angelos Menelaou Discussion on Education Phedonas Phedonos Panayiotis Zaphiris Maria Panayiotou Wassim El Hajj Sotiris Themistocleous Discussion on Sunstainable Tourism Irene Loucaides Sotiroula Liasidou Olga Theocharous Papageorgiou Andros G. Karayiannis Maria Stylianou Michaelidou Chirag Padubidri Yiannis Tsouloftas Michael Beys Doris Christodoulou Presentation of Localwatch Stefanos Loukopoulos Andreas Hadjipetrou Julian Agyeman Dimitris Papastergiou Phillippe Froissard Andreas Kitromilides Christos (Pieri) Zannettou Gerasimos Lyberatos Eleni Loukaidou Ekrem İmamoğlu	

		Kostas Bakoyiannis Dr. Anna Petit-Boix Anastasis Filippou Sabina Achim Alexandros Tsiatinis Haakon Aleksander Eng Jun.-Prof. Dr. Sina Leipold Leendert Verbeek Vasco Alves Cordeiro Joan Ribó i Canut Ana Melchor Pérez Annika Dalén Nestor Fylaktos George Partasides Dimitris Stagonas Dinos Nicolaides Sokratis Metaxas Mrs Yordanka Fandakova Andreas Papacharalambous Dr. Theodoulos Mesimeris Franziska Barnhusen Nick Voulvoulis Thomas Fruergaard Astrup Elena Stylianopoulou Pantelis Georgiou Costas Koumis Andreas Katshis Rebecca Larson Naguib Sawiris Stavros Malas Theodoros Pyrillis Anthoulis Kountouris Georgia Demetriou Georgia Christofidou George Takkas Eftyhia Andreou Alexis Vafeades Athena Michaelidou Antonis Christou	

		Nasos Hadjigeorgiou Irene Piki Antonis Oikonomides Konstantinos Ioannou	
Woskshop date			
Brief			

6 Contract with signatures

Date of signature	Name	Signature
14/09/2023	Nicos Nicolaides	
Mayor of City Limassol		
14/09/2023	Limassol City Council commit during the 174th assembly	

These are the members of the City Council who were present and unanimously agreed to the CCC. CNCD Appendix I contains the official minutes of the Council Decision (in Greek):

Nicolaides Nicos (Mayor)

Municipality councelors: Agapiou Nikos, Anthousis Theodotos, Vasileiou Michalis, Yiallouros Kostas, Dimitriou Kristis, Epaminondas Giorgos, Ioakim Elias, Karaiskakis Evripides, Kombos Adamos, Koufallis Simos, Mavroudis Loizos, Neophytou Andreas, Nikolaou Andreas, Pantelidou Niki, Spatharis Loukas, Sokratous Michalis, Ttoppouzis Prodromos, Trikkis Charis, Fellas Michalis, Psaras Apostolos

Municipality Clerk: Efstathiades Christos

Appendices

CNCD Appendix I City Council approval (In Greek)

CNCD Appendix II Protocols for cooperation and Memorandums of Understanding (MOUs) (In Greek)

CNCD Appendix III Evidence for Stakeholders engagement

Appendix III: Evidence for Stakeholder Engagement

Co-workshops: Participatory co-design solution workshops

Co-workshop methodology (protocol) has been developed in the pilot project LC3. A co-workshop is a transition-long effort by a team of 15-20 people from a single group of stakeholders (AP Intro Section 1.3.3) and is in this respect only homogeneous. It is organized around one or more face-to-face 3-hour sessions and includes initial group selection and preparation, subsequent synchronous and asynchronous online communication, and long-term team building. It is guided by a Transition-trained facilitator whose role is to organize, listen, conduct the face-to-face sessions, monitor the progress, evaluate the outcome, and transfer the learning to the whole Transition arena. Each workshop has a central theme, a specific issue for consideration and solution design. The sessions are interactive with well-designed activities and a self-reflection ending in each. Experts may join parts of the physical or online interaction, especially at the beginning and for answering feasibility questions and transferring experience from beyond Lemesos. The evolving concrete outcome of co-workshops is their co-designed solutions developed. The main expected impact is the change of attitude of the participants towards Climate Change, the Municipality and their personal and collective capacity to become change agents. Both outcome and impact of co-workshops are open (may change) and long-term. Is it expected that co-workshop participation will evolve in time with some new members joining and old leaving.

NZ Lemesos 2030 Public Discussions

"Transition to a Climate Neutral and Smart Limassol. The Mission of the European Union for 100 cities by 2030"

Description

The presentation and official Kick-off event *"Transition to a Climate Neutral and Smart Limassol. The Mission of the European Union for 100 cities by 2030" took* take place on November 28, 2022, at 7:00 PM, at the Pattichio Municipal Theater.

During the event, the Mayor of Limassol, Mr Nicos Nicolaides greeted the attendees with a speech during which he set his vision for NZ Lemesos 2030.

Following the welcome note of the mayor, the Deputy Minister of Research, Innovation, and Digital Policy, Mr. Kyriakos Kokkinos greeted the event, during which he confirmed the support of the National Government in this endeavor.

Additionally, the event was greeted by the Head of Unit of the Cities Mission secretariat Mr. Philippe Froissard and by the Greek National Network and the Mission of 100 cities, Chairman of the Administrative Board of the Central Committee of Greek Municipalities & Mayor of Trikala, Mr. Dimitris Papastergiou.

In continuation, the participants received information by the NZ Lemesos 2030 General Coordinator, Penelope Vasquez Hadjilyra, regarding the structure of the EU Mission: 100 Climate Neutral and Smart Cities by 2030 Program and more specifically the draft strategy the transition core team had set regarding the case of NZ Lemesos 2030. During the presentation the need for the preparation of the city's roadmap, the Climate City Contract, was communicated and the plan of grouping the work that had to be done for the coordination of the entire task into 5 thematics was explained. At that time, the Limassol Municipality began forming alliances with several organizations including academic institutions for managing the task of setting the Transition Plan to Climate Neutrality.

After the completion of the presentation, a panel formed by a multi-stakeholder participation list including, Mr. Chrysis Nicolaides, Member of the European Commission's Mission for Climate-Neutral and Smart Cities & Advisor to the Municipality of Limassol, Dr. Nestor Fylaktos, Cyprus Institute, Ms. Evi Anayiotou, Ministry of Transport, Communications & Works, Responsible for Sustainable Mobility, Dr. Ioannis Vyrides, Assistant Professor, Department of Chemical Engineering, Technological University of Cyprus, Dr. Angelos Menelaou, Head of the Department of Maritime Transport & Trade, Associate Professor, Frederick University, Dr. Despina Stergides, Cyprus Institute and Mr. Haris Trikkis, Municipal Councilor of Limassol & President of the Municipality of Limassol's Committee on European Affairs followed during which the "NZ Lemesos 2030" was discussed. The attendees placed questions to the panelists, concerns, doubts, hopeful thoughts and advice.

Evidence

World Environment Day – Climate Change

Description

The NZ Lemesos 2030 participated in the event "World Environment Day – Climate Change" with the presentation of the draft strategy, the transition core team had set regarding the case of NZ Lemesos 2030.

Presentations on "Climate Change and Policies" followed by Dr Charalambos Theopemptou, leader of the Cyprus Green Party since 2020 and member of the Cypriot House of Representatives since 2016 and Mr. Edmond Hawilla, Limassol District Secretary of the Cyprus Green Party.

During the event all attendees participated in a structured round table discussion during which the transition core team collected opinions, concerns and advice regarding the evolution of the design process of the Climate City Contract. The participants stressed throughout the conversation the importance of Limassol Municipality to follow a co-design process of the CCC.

Evidence

Trash talk #3 Mission Limassol 2030: Smart Transformation

Description

On Trash talk #3 Mission Limassol 2030: Smart transformation various topics related to digitalization, smart parking, smart monitoring, benefits, challenges, and potential risks associated with these technologies were discussed. The event explored deriving better business and societal outcomes by leveraging smart devices, big data, artificial intelligence, and cloud technologies.

One of the primary goals of the event was to engage the residents of Limassol in the development of a significant Smart City project. The second part of the event was a workshop for all attendees to explore the various aspects of digitalisation, smart parking, and smart monitoring in Limassol. The event gathered the residents' opinions and transfered them to the municipality so further actions based on the feedback received from its citizens could be taken.

Overall, the event was an exciting and informative discussion, bringing together experts and residents to discuss important issues related to upgrading Limassol into one of 100 Europe's smart cities by the year 2030. It was an excellent opportunity for the residents of Limassol to have their voices heard and contribute to developing a significant project that will benefit the community.

Evidence

https://www.instagram.com/reel/Cs8hhYeJvM9/?igshid=MTc4MmM1YmI2Ng==

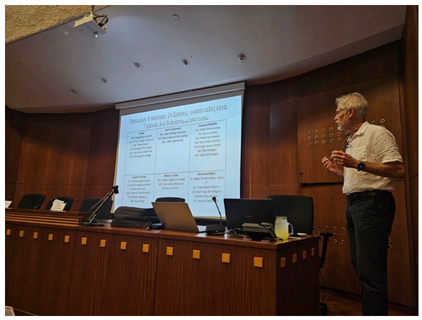
Cyrus NZ Cities Network

Description

Discussions on preparing a collaborative proposal directed to the Deputy Minister to the President for actions related to Energy.

The plan is being co-designed with the Municipalities that belong to the Network, the Electrical Authority Cyprus, Regulatory Authority of Energy Cyprus, the Cyprus Institute and Frederick University.

Evidence

NZ Lemesos 2030 Participation in Festivals

Maritime festival

Description

The established biennial event “Maritime Cyprus 2022”, organized by the Shipping Deputy Ministry in cooperation with the Cyprus Shipping Chamber and the Cyprus Union of Ship owners, took place in Limassol between 9 and 12 October 2022.

The transition core team participated in order to communicate and interact with stakeholders of the private and public sector whose activities relate to the Sea, Blue Innovation, Port and Marina management etc.

During the event, the team presented the EU Mission Cities Program and exchanged with different stakeholders.

Evidence

Reflect festival

Description

The festival is the largest tech & entrepreneurship event for startups, investors and decision-makers on the sunny island of Cyprus, an up-and-coming tech hub.

The transition core team participated in October 2022 to communicate and interact with stakeholders of the private sector and more specifically Technology companies whose activities are hosted in the Limassol Municipal grounds.

Evidence

Thalassa festival

Description

Evidence

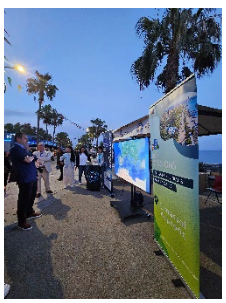
Europe Day festival

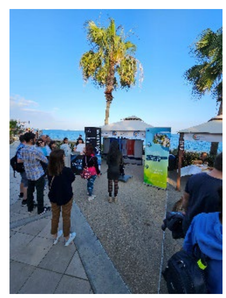
Description

On 7 May 2023 the Limassol Municipality co-designed with Eratosthenes Centre of Excellence an interactive quiz on Climate Change and the ways Mission Cities aim to tackle its challenging effects. The quiz took place in Molos Seaside Park during the Europe Day 2023 celebrations. Citizens and visitors of Limassol had the opportunity to learn through play.

The quiz included the juxtaposition of images taken with the Copernicus, Earth Observation component of the European Union's space program, during which the participants through a series of questions had to identify the consequences of Climate Change in Cyprus and the Easter Mediterranean as a whole. At the end of the quiz, glass reusable water bottles were handed to the players.

Evidence





NZ Lemesos 2030 Transition Arena Conferences

Cyprus Forum Cities 2023

Description

The first Cyprus Forum Cities brought together local and international urban policy experts and stakeholders in Limassol to exchange views in an effort to shape a long-term sustainable strategy for cities and communities on the island.

The event took place on April 7-8, 2023, aiming to assist local municipalities and communities in developing new dynamics and technologies, while strengthening relations between the local government and citizens.

Experts and professionals from the public, private and academic sectors from Cyprus and abroad presented what is a “smart city,” by using digital technology to manage traffic, and smart parking, as well as for waste management, promoting mobility, and implementing green policies.

The event accumulated diverse European and Cypriot expertise in areas such as building Europe through local governance, sustainable development of local governance, circular economy, sustainable mobility, energy and the environment, sustainable tourism, maritime and blue development.

The President of the Republic of Cyprus attended the event. During his speech he commited to support the initiative of the Lemesos citizens to create a roadmap and implement required actions to achieve Climate Neutrality twenty years earlier than the rest of Europe.

Evidence

[Cyprus Forum Cities 2023 - Saturday, 8th of April 2023, Livestreaming - YouTube]

Report

The 54 page report includes a summary of the two day conference. The report is being edited into a booklet and will be distributed during Cyprus Forum Cities 2024.

Cyprus Forum 2023

Description

The Cyprus Forum becomes a lever and catalyst for change through discussions and debate leading to commitments, actions and ultimately outcomes that will improve and promote sustainable and socially responsible policy in Cyprus and the wider Eastern Mediterranean region. The Cyprus Forum brings together local and foreign political leaders, important figures from the public and the private sector, the media, academia and civic society with the aim of initiating dialogue, exchanging ideas and finding new and creative solutions to key areas of public policy.

During the conference the NZ Lemesos transition core team concluded the preceded regulatory project week co-designed with NetZeroCities City Advisor Bob D'Haseleer, the Cyprus Institute and Limassol Municipality, panel entitled *"Flexibility as a driver for innovation: the case of regulatory sandboxes".*

During the discussion an overview of of climate-neutral initiatives and the associated regulatory and technological challenges was provided, the concept of regulatory sandboxes was introduced and their significance in nurturing social innovation and bolstering sustainable endeavors such as climate neutrality. The case study NZ Lemesos 2030 was discussed and the need of Regulatory Sandboxes for Climate Initiatives was further analyzed. The discussion followed on the ways innovation and risk can be balanced and concluded with the presentation of lessons learned from other sandbox initiatives.

Evidence

CF 2023 | Flexibility As a Drive For Innovation: The Case of Regulatory Sandboxes - YouTube

Cyprus Forum 2024

Description

TBA

NetZeroCities Lemesos 2030 Advisor Project Weeks

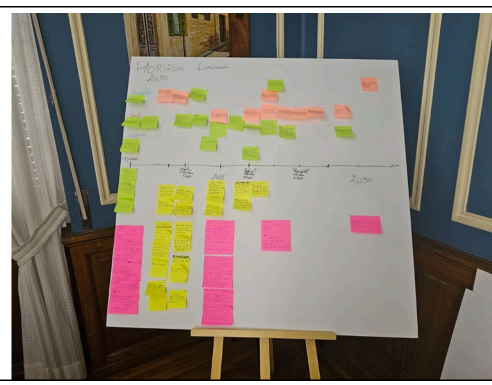
SNAP

Description

The Project Week consisted of workshops and meetings for mapping the city and setting a timeframe. The priorities of the city were identified and engagement with the different teams in the cities was organized. Transformative actions were drafted and co-benefits were identified.

At the end a report of the NZ Lemesos 2030 city advisor was shared and utilized during the preparation of the CCC.

Evidence



EU MISSION: Climate Neutral and Smart Limassol by 2030- CITY ADVISOR VISIT
CITY ADVISOR: BOB D'HAESELEER
DATES: 13-17/03/2023

	MONDAY 13/03/2023	TUESDAY 14/03/2023	WEDNESDAY 15/03/2023	THURSDAY 16/03/2023	FRIDAY 17/03/2023
08:00-09:00	INTRODUCTION	FINANCE	PILOT CITY SESSION		
09:00-10:00	HORIZON TASK 1 GENERAL			MEETING WITH MAYOR	
10:00-11:00					DEPUTY MINISTRY OF INNOVATION
10:30-12:30	HORIZON TASK 1 THEMATIC BREAKOUT HORIZON TASK 1 THEMATIC OVERVIEW	TRANSITION TEAM WITH DARK MATTER LABS	MINISTRY OF TRANSPORT EMEL (TBC) CUT (TBC)	LIMASSOL CITY VISIT WITH LIMASSOL MUNICIPALITY TECHNICAL DEPARTMENT OFFICER	MINISTRY OF FINANCE DIRECTORATE GENERAL GROWTH
13:30-15:30	HORIZON TASK 2 OPP&BARR BREAK OUT HORIZO TASK 2 OPP&BARR OVERVIEW	DATA WITH NIKOLAI JAKOB	LIMASSOL CITY VISIT PORT/MARINA (TBC) WITH FREDERICK UNIVERSITY CUT (TBC)	EMEL (TBC) PORT/MARINA (TBC) WITH FREDERICK UNIVERSITY CUT (TBC)	EVALUATION OF PROJECTWEEK
16:00-18:00	HORIZON TASK 3 STAKEHOLDERS	DEEP DIVE ACTION PLAN WITH KATHERIN KAMI	NGO SESSION		
18:00-20:00				WORKSHOP WITH COUNSELORS	

LIMASSOL 2030
EU CITIES MISSION

Political Project Week

TBA

1st round of participatory co-workshops for NZ Lemesos 2030 Climate City Contract

The core transition team of the Limassol Municipality co-designed along with the RIMS Coordinator of the Cyprus Institute, the Consultant to the Head of Department of Maritime Transport & Commerce of Frederick University and Special Teaching Staff of the Cyprus University of Technology the methodology for conducting the first round of participatory co-workshops for the co-design of the Climate City Contract.

The aim of the co-workshops was tri-fold. First it was a first attempt to engage with concerning stakeholders per thematic, secondly the vision for Limassol 2030 was to be co-designed by the attendees and third information on how to move forward was to be collected.

Methodology:

Workshop Purpose

Mapping/Recording the current situation and the main components of action plans for achieving climate neutrality and a smart transition within the municipal boundaries of Limassol until 2030.

Informing and engaging stakeholders of different thematics in the European Mission: Climate-Neutral and Smart Limassol by 2030.

Description

The attendees registered to the workshop. It was important to annotate who joined from each organization as to initiate the creation of the Transition Arena. The mayor proceeded into welcoming the participants and then continued to setting his vision for NZ Lemesos 2030. The Limassol Municipality transition core team proceeded into presenting the "European Mission: 100 Climate-Neutral and Smart Cities by 2030" program and the importance of the 1st co-workshop for the collection of the participants input. Each theme/ thematic coordinator presented their thematic and the different existing local, national, European and international Policies and Strategies regarding Climate Change and the specific subject.

The participants were divided into tables of six and participated in 4 structured exercises:

Exercise 1 - Vision for Limassol within "Thematic"

Participants were asked to set their vision for NZ Lemesos 2030 within the related thematic. (i.e. “How does the NZ Lemesos 2030 transport system work?”

Exercise 2 - SWOT - Recording Current Situation of Limassol and "Thematic"

Participants were asked to record the Strengths, Weaknesses, Opportunities, Threats of reaching Climate Neutrality by 2030 in the specific thematic. The collection of data was done on post-its. For each subcategory, the participants were asked to attempt to categorize their answer in three pillars: Governance, Environment and Culture.

Exercise 3 - GAP Analysis

Participants communicated their estimation what is the GAP from Climate Neutrality.

Exercise 4 - SWOT Actions Brainstorm

Participants were asked to provide solutions and suggestions according to the Strengths, Weaknesses, Opportunities, Threats of reaching Climate Neutrality by 2030 in the specific thematic. The collection of data was done on post-its. For each subcategory, the participants were asked to attempt to categorize their answer in three pillars: Governance, Environment and Culture.

Program

Monday 13/02 12:45-16:00 CIRCULAR ECONOMY
Tuesday 14/02 08:45-12:00 STRUCTURED ENVIRONMENT
Tuesday 14/02 12:45-16:00 ENERGY
Wednesday 15/02 08:45-12:00 TRANSPORTATION
Wednesday 15/02 12:45-16:00 COASTAL/MARINE AREA

Stakeholder mapping

Each of the coordinating academic partners prepared a stakeholder list from Central Government, Local Authorities, Limassol Municipality, Private Sector, NGOS.

The workshop aimed for the attendance of 15 stakeholders.

Organizer

Limassol Municipality

Coordinators

Department / University / Institute

Raporter

Limassol Municipality

Registrations

Limassol Municipality

Presentations/Comments

Limassol Municipality

Refreshments

Limassol Municipality

Photography

Limassol Municipality

Tools

Boards / Wall
Post-it
Pen
Projector
Computers

Location

Center for Innovation in Blue Economy

Workshop Results

The results of the workshop was collected and reports were prepared with the different conclusions.

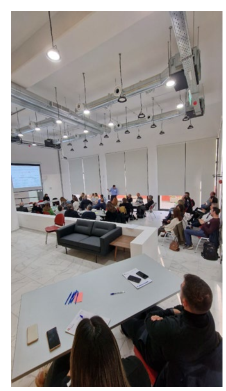
Agenda

Registrations
Welcome by the Mayor (5 minutes)
Introductory Presentation (15 minutes)
"European Mission: 100 Climate-Neutral and Smart Cities by 2030" (emphasizing the importance of actions that should be feasible within the capabilities/strategy/culture of each city)
Presentation (10 minutes)
"Thematic" i.e. Transports
Presentation (10 minutes)
"Existing Policies and Strategies in the Thematic (i.e. Transports)"
Working Group Coordinator (name of coordinator) from (name of Department/Institute/University)
Introduction to the exercise structure (5 minutes)
Exercise 1 - Vision for Limassol and "Thematic" i.e. Transports
in 2030 (15 minutes)
Exercise 2 - Recording Current Situation of Limassol and "Thematic" i.e. Transports
SWOT Analysis (40 minutes)
Break (20 minutes)
Exercise 3 - GAP Analysis (10 minutes)
Exercise 4 - SWOT Actions Brainstorm (40 minutes)
Workshop Results (10 minutes)

Evidence







2nd round of participatory co-workshops for NZ Lemesos 2030 Climate City Contract

Description

In July 2023 the Transition Core team invited the Limassol Municipality City Counselors and Officers to present the draft Climate Neutrality Action Plan. The team received feedback on the findings in order to adjust the CCC.

Evidence

3rd round of participatory co-workshops for NZ Lemesos 2030 Climate City Contract

Description

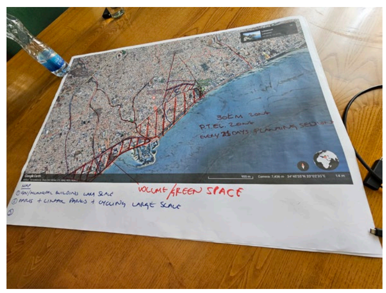
Following the 2nd round of participatory co-workshops for NZ Lemesos 2030 Climate City Contract the need to create more “intimate” workshops had arisen.

Taking the opportunity of the tools being developed for the LC3 Pilot Cities Program the partners and transition team organized a series of co-workshops with city councilors and Limassol Municipality officers.

The co-workshops were five in total.

Evidence



1st participatory co-design solution for the case of Anexartisias Street

Description

The Municipality of Limassol has undertaken decisive actions to address its traffic challenges, notably considering the pedestrianization of Independence Avenue, the city's busiest street. Mayor Nikos Nicolaides, in an introductory speech, stressed the necessity of difficult yet essential measures to prevent passing the traffic problem to future generations. Public consultations, including workshops and a questionnaire with 1045 participants, were conducted. Results revealed citizen concerns about safety, accessibility, and a desire to reduce traffic and pollution. The workshops, led by architect and engineer Dr. Grigoris Kalnis, underscored the need to consider various effects, including economic, traffic-related, social, and environmental consequences. Independence Avenue's potential pedestrianization is seen as a pivotal step in reshaping the city's approach to mobility. Despite overall support for sustainable urban measures, some residents, particularly those in the affected area, expressed concerns about potential disruptions to their daily lives.

Evidence

[announcement (limassol.org.cy)]

1st participatory co-workshops for School Environments

Junior Achievement Cyprus "Blue Economy Innovation Camp"

Workshop Purpose:

Mapping/Recording the current situation in school environments and co-design of quick actions- low hanging fruits by the attendees.

Stakeholder mapping

The teachers from nine schools who accompanied students at the 1ST Junior Achievement Cyprus "Blue Economy Innovation Camp" had the opportunity to attend a teachers' training session on EU Mission for the 100 climate-neutral and smart cities by 2030, in which Limassol is a participant city.

Evidence

Lanitio Gymnasium students

Description

The Limassol Municipality invited the high school students from Limassol and Trikala (Greece) to share their research based presentations on Climate Change and more specifically Mobility. The students created a series of actions that could be immediately implemented as to minimize traffic congestion during peak hours.

The Transition core team is taking as example different of the activities and are planned to be implemented early 2024.

Evidence

1st participatory co-workshop for University Environments

Frederick Architecture Students share their thoughts

Description

Students from the Architecture Program of Frederic University participated in a two hour workshop during which the NZ Lemesos 2030 transition team presented the Climate City Contract development process followed by a round table discussion.

The future architects suggested to the NZ Lemesos 2030 team the implementation of the 15 minute city urban design concept as a way to minimize transport emissions.

Evidence

Social Media interaction

Description

The Limassol Municipality core transition team commenced its Social Media activity in February 2023.

As part of its communication strategy, it is active in five social media outlets in order to interact with different groups of stakeholders.

Beyond used as an announcement hub the transition core team has also used it for the distribution of questionnaires and collection of data from citizens.

This interaction is currently being developed and through the deliverables of the LC3 Pilot Cities Project it is expected that will be matured.

Instagram
[@missionlimassol.eu]

Facebook
[Mission Limassol 2030]

LinkedIn
[Mission Limassol 2030]

Twitter
@missionlimassol

YouTube
[Mission Limassol 2030]

Student Competition

The Limassol Municipality within its strategy for participatory engagement co- organized with the NGO Terra Cypria and the Ayios Ioannis Lyceum a student competition for video creation entitled “Climate Change- Constructing the Lemesos of 2030”.

Schools that are located within the Lemesos municipal borders had the opportunity to participate. The students that participated submitted their video projects and the Limassol Municipality accepted public votes through the YouTube channel: Mission Limassol 2030 - YouTube .

Pilot city project: Lemesos City Cooling Challenge (Lc3)

Description

The Lc3 (Lemesos City Cooling Challenge) project tests the systemic combination of three innovative pathways to accelerated decarbonization in a living lab environment. One is the overcoming attitudes and behaviors of apathy, helplessness, and myopic self-interest through broad stakeholder participation in co design/creation solution workshops extending deeply in the pilot activities governance so that the learning/reflexive cycle cuts through Project, Mission, City, and local Society.

The participatory (co-design workshops and Lemesos Commons in Governance), inclusive (multiple stakeholders: owners, professionals, scientists, civil society), uses multiple levers of change (technology, finance, CoL capacity building, regulatory transformation, social alliance building) setting the foundations of a systemic change in a real-world living lab).

The participatory co-design solution workshops (“co-workshops”), whose purpose is to develop sustainable solutions and whose hidden curriculum is to make their participants agents of change in the city. Several dozens of co-workshops will be run, each with about 20 participants from a homogeneous stakeholder group and a facilitator. A problem relevant to the stakeholder group is selected and presented and the group is assisted in collectively develop solutions, pinpointing challenges, and proposing methods for overcoming them. In addition to the solutions co-developed, each co-workshop ‘delivers’ its ‘graduates’ who having been through such a process will become catalysts for change in their environment, promoting the spirit of “together for implementation” through support of the specific solutions co-developed, of the co-workshop methodology as the city-citizen interaction model and of the need and feasibility of climate action. Depending on the group and the time available, the maturity of solutions developed will vary. In some cases, the outcome will be “shaping the challenges” and “scouting and qualifying appropriate solutions” rather than solutions. For this we first develop the co-workshop methodology and the learning activities (‘learning material’) that will guide the process of co-developing the solutions for each type of workshop. Another important activity in WP1 is the establishment and operation of The Lemesos Commons. It has the form of a long-lasting co-workshop, with rotating heterogeneous participants from all stakeholder categories. (Forming a heterogeneous group from the members of previously consulted homogeneous groups is the classic “jigsaw” method for active participation in education. There is a plethora of other participatory digital planning tools that can support the whole process.) The Lemesos Commons is part of the project governance scheme where the solutions developed by the homogeneous co-workshops are deliberated and decided for the project team to implement.

Lc3 - 3rd round of participatory co-workshops for NZ Lemesos 2030 Climate City Contract

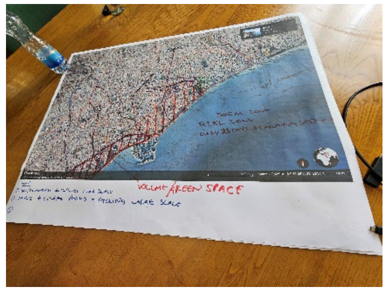
Description

Following the 2nd round of participatory co-workshops for NZ Lemesos 2030 Climate City Contract the need to create more “intimate” workshops had arisen.

Taking the opportunity of the tools being developed for the LC3 Pilot Cities Program the partners and transition team organized a series of co-workshops with city councilors and Limassol Municipality officers.

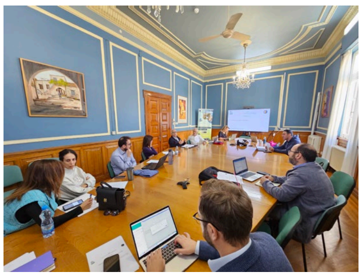
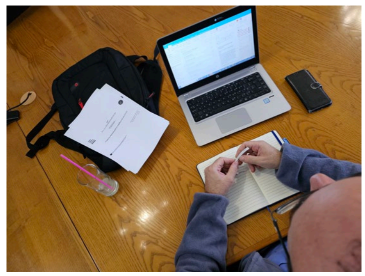
The co-workshops were five in total.

Evidence


Lc3 – 1st round of participatory co-workshops with NZ Lemesos 2030 Transition Core Team

Evidence


Lc3 – 1st round of participatory co-workshops with Municipal Supervisors

Evidence

TBA

Lc3 – 1st round of participatory co-workshops with Municipal Council

Lc3 – 1st round of participatory co-workshops with citizens – facilitator training

Evidence

Abbreviations

CNAP	Climate Neutrality Action Plan
CCC	Climate City Contract
Lc3	Lemesos City Cooling Challenge
NZ Lemesos 2030	Net Zero Lemesos 2030