NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan of the City of Liberec

Liberec

NetZeroCities has received funding from the H2020 Research and Innovation Programme under the grant agreement n°101036519.

Summary

This Action Plan is developed as part of the City Climate Contract, reflecting the City's ambition to become climate neutral. The Action Plan elaborates on the strategic priorities defined in the Commitments template and, following the action plan template, describes the current state of climate action in Liberec, including the GHG emission inventory. It outlines pathways towards climate neutrality by 2030, featuring a portfolio of actions aligned with these pathways, a section dedicated to monitoring, evaluation, and learning, as well as a list of governance and social innovations enabling climate neutrality by 2030. This document was developed with the engagement of various key stakeholders, including citizens. An integral part of the Action Plan is the investment plan, which details the financial resources necessary for its implementation and identifies the relevant financial stakeholders.

This Action Plan outlines the suggested pathways and actions required to achieve an 82% reduction in GHG emissions compared to the baseline year of 2019. These pathways align with the NZC Theory of Change, the city's emission inventory, other strategic documents, and public input. The Action Plan emphasizes the sectors of buildings and transport. Specifically, it highlights the need to enhance the energy performance of buildings (private, municipal, regional, commercial/industrial), phase out remaining coal boilers in households, and construct renewable energy sources, including large solar and wind power plants, and the installation of PV panels on building roofs. The concept of community energy must be further developed, in line with energy management and the decarbonization of the heating system. Additionally, the city must focus on transport electrification (both private and public) and support active mobility. The city's efforts should also prioritize capacity and capability building, networking, and learning.

A successful implementation of this Action Plan requires an increase in municipal capacity, both in terms of the number of employees and professionals involved, as well as an increase in investments in the climate transition. It is crucial to leverage both private and public resources and actively engage private actors and investors. The city is aware of the barriers and necessary steps, and this CCC Action Plan (Climate City Contract) will serve as a starting point and a tool for further facilitating cooperation with key stakeholders, including financial stakeholders.

At the end of this document, social and governance innovations that enable the successful implementation of the suggested actions are listed.

List of figures

List of tables

Abbreviations and acronyms

Acronym	Description
AFOLU	Agricultural, Forestry and Land Use Emissions from land use and land use changes are included.
AP	Action Plan
ARR	Regional Development Agency
BAU	Business as Usual
CCUS	Carbon Capture, Utilization, and Storage
CDP	Carbon Disclosure Project
CH_4	Methane
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
CSN Standard	Czech technical standard
CSR	Corporate Social Responsibility
DNSH	Do No Significant Harm
DPMLJ	Transport company of the cities of Liberec and Jablonec nad Nisou
EIB	European Investment Bank
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Contracting
ESG	environmental, social, governance
EU	European Union
EUCF	European City Facility
EU ETS	European Union Emission Trading Scheme
ETS2	new emissions trading system
EVs	Electric vehicles
GEP	Gender Equality Plan
GHG	Greenhouse gases
IP	Investment Plan
IPPU	Industrial Process and Product Use Emissions of fluorinated gases from production of cooling devices were included.
ISO	International Organization for Standardization
KNL	Regional Hospital
KPI	Key Performance Indicator
KÚLK	Regional office of the Liberec region
LED	Light-Emitting Diode
LEX RES III	Czech legislation (Adoption of legislation to support renewable zones i.e. acceleration zones, - legislation that will support energy sharing) –
LPG	Liquified Petroleum Gas
MEL	Monitoring Evaluation & Learning
MRV	Monitoring Reporting Verification
NECP	National Energy and Climate Plan
NF_3	Nitrogen trifluoride
NGO	Non-governmental organization
NIMBY	Not in my backyard
N_2O	Nitrous Oxide
NZC	Net Zero Cities
PCP	Pilot City Programme
P+R	Park and ride
RED III	Renewable Energy Directive

RES	Renewable energy sources
RIS3	Research and Innovation Strategy for Smart Specialisation
SECAP	Sustainable Energy and Climate Action Plan
SF_6	Sulphur hexafluoride
SNAP	Support Needs Assessment Process
SUMP	Sustainable Urban Mobility Plan for the Agglomeration of cities Liberec – Jablonec nad Nisou
TAČR	Technology Agency of the Czech Republic
WG	Working groups
WP	Work Package

1 Introduction

The Action Plan is developed with the city's ambition to achieve climate neutrality by 2030, positioning Liberec as a pioneer in this field in the Czech Republic. This introduction outlines the complexity of the entire transition process, drawing on background data about Liberec and its strategic planning. It details the overall workflow, lessons learned, struggles and barriers encountered, and presents our vision, long-term goals, and areas of focus.

Background information about the city in the context of climate neutrality commitment

Long-term vision of the city (stated in the master plan of the city from 2022):

Liberec, as a heart of the Czech north, economic centre, modern and innovative city using technological progress, ensuring best-quality housing and services, supporting active life including culture and sports, attractive for citizens, visitors and employers, city very well accessible, permeable and long-term sustainable, surrounded by unique mountain landscape with rich water sources, ensuring air protection and ready to adapt to climate change, city where everyone gets own space for self-realization and personal development, Liberec is where there is wellbeing for citizens and city prosperity in harmony.

Administrative and political organisation of the city:

The city of Liberec is the main city of the Liberec Region, 5th biggest city in Czechia, located near to Poland and Germany, 90 km away from the capital city Prague, surrounded by forests and mountains. The city is spread over an area of 106 km2 and with the population of 107 389 (31.12.2023). 35 % of the city area is represented by agricultural land, forest land make up 40 % of the city cadastral area.
The city has 33 city districts and 26 cadastral areas. City (as NUTS 5: CZ0513563889) is a part of the Liberec region (NUTS 3: CZ051), where there the Regional Office of the Liberec region is a higher authority, Liberec is also a member of the Nisa Euroregion. The city of Liberec is responsible for self-government (self-governing community of citizens) which means city as a municipality is a public corporation with its own property and acts in legislative relations in its name and bears responsibility arising from these relations, and in delegated competence for the state administration.

When it comes to **political organisation of the city**, the main city representative is the **mayor** of the city (Ing. Jaroslav Zámečník, CSc.), the final **decision-making power has the city council** (which is based on the Act No 128/2000, Coll. on Municipalities). In the **city council**, there are 39 representatives both of leading coalition of political parties and opposition political parties (that signed the coalition contract for period 2022 – 2026). In coalition programme, there is, beside other, accent on solar panels installation on municipal buildings, accent on climate neutrality and community energy development.
In the **city board**, there are 11 representatives (all representatives are also city counsellors) of leading political coalition. Their responsibilities (city council and city board) are based on the Act on Municipalities, which means that the **city board is responsible for**: management according to the

approved budget, fulfilling the tasks of the founder of legal entities and facilities, discussing and resolving proposals and comments of city council, establishment of commissions and professional working groups, etc. The **city council is responsible for**: approval of the municipal budget, approval of the development program of the city, decision making about establishment or dissolution of legal entities, decision about city's participation in companies and foundations, approval of binding decrees in matters of self-government, etc. Currently, besides the city mayor, there are 8 deputy mayors where each deputy mayor is responsible for a specific area and as a political leader in this field works directly with heads of relevant municipal departments. The following election for the city council will be held in autumn 2026.

City council has its own **Committees**, City board has its own **Commissions** (advisory bodies). Regarding the climate neutrality, the relevant ones are Commission for climate neutral city, Commission for Local Agenda 21, Commission for Smart City, Commission for Technical Services of the City, Commission for Municipal Forests, and Commission for Transport. Furthermore, there are Committees as: Financial Committees, Committee for Spatial Planning and Transport, Committee for Strategic Development, Committee for Education. Mentioned committees and commissions have the advisory role, they are expert and advisory bodies for city council/board representatives. Within the **working process**, city counsellors have regular meetings (both city board and city council), for each meeting are prepared materials by municipal departments officials/clerks, and these materials are discussed by propriate (regarding the topic of submitted material) committee(s) and/or commission(s) first. Usually, materials are discussed by specific city board commission, then are discussed by city board and when the city board approves it, the material is examined by city commission and approved by city council as final instance having a decision-making power.
Furthermore, for various city districts, there are **Local Commissions (**replacing former District Committees that can be established according to the Act No 128/2000 Coll., as an advisory and initiating body of the city council, which is decentralisation in case of self-government). Local Commissions are advisory bodies for city board, currently, these commissions are being established in accordance with new Principles for local commissions. Besides, there are **professional working groups** for diverse topics. These working groups are usually important in case of strategic planning, it is a way how to engage professional (mainly) and wide public to the process of strategic planning (strategic documents development).

Key data on demographic and socio-economic characteristics of the city

Liberec is a developed and dynamic city with an industrial character, yet it offers extensive forests, water surfaces, and beautiful natural surroundings close to the city centre. This unique combination attracts visitors who come for skiing, hiking, cycling, and sightseeing, particularly to explore the city's architectural monuments. The architectural character of the city centre is still largely shaped by the major reconstruction that took place at the end of the 19th century, a period marked by significant cultural and economic growth in the city.

Regarding **demographic data**, Liberec shows a slight increase in both population and the average age of its citizens. Nearly 60% of residents have completed secondary education, placing Liberec among the leading regional cities in Czechia in this regard. Approximately 15% of citizens hold a university degree, which exceeds the national average. However, Liberec also has socially excluded areas—about 20 such areas across the city, typically represented by separate apartment buildings or small clusters of up to three houses. These areas are not spatially isolated but are economically disadvantaged. Approximately 6% of citizens are at risk of poverty and social exclusion, making this a visibly vulnerable group in Liberec. Additionally, there has been a noticeable increase in the number of migrants, particularly from Ukraine, as a result of the ongoing conflict.

In the field of **housing**, ensuring availability is becoming increasingly challenging and will require a conceptual and long-term approach. Currently, efforts are being made in the area of social housing. A sizeable portion of houses and apartment buildings (over 43%) were built before 1945, which poses challenges regarding energy efficiency. The low municipal ownership of housing apartments is also problematic, as it limits the capacity for social housing and reduces the city's ability to influence energy efficiency improvements. Additionally, the aging municipal housing stock leads to issues such as poor energy efficiency and, in some cases, unsafe conditions. Over the past 15 years, measures have been implemented to improve energy efficiency and reduce emissions, including the replacement of old solid fuel boilers, thermal insulation upgrades, and improved lighting, supported by subsidies from the Operational Programme Environment and the (New) Green Savings Programme. Despite these efforts, there remains significant potential for further development of renewable energy sources (RES) in the city.

In the economic environment, despite the region's historically industrial character, the tertiary service sector now dominates, accounting for more than 60% of registered business entities. Industrial enterprises make up about 25%, while the primary sector—agriculture—constitutes only 2%. The largest companies in Liberec operate in the automotive, air conditioning, institutional healthcare, and construction sectors. Major employers include the Regional Hospital of the Liberec Region, Magna Exteriors Bohemia (automotive), DENSO Manufacturing Czech (automotive and air conditioning), and the Technical University of Liberec, among others. Liberec has two industrial zones where companies maintain close supplier-customer relationships and cooperate extensively. The labour market is characterized by a significantly above-average share of people employed in the manufacturing industry. However, the city’s unemployment rate is above the national average. As the economic centre of the region, Liberec has a high rate of commuting for work and education. Liberec also shows strong potential in research and innovation, supported by its regional university, which includes various faculties and the renowned Centre for Nanomaterials (notably nanofibers). Expenditures in research and innovation have been trending upward over time. However, some weaknesses include a high dependence on manufacturing (indicating low diversification), a relatively high and persistent unemployment rate, a

significant number of immigrants with low educational attainment, and a limited transfer of research results into practical applications.

Regarding technical infrastructure and municipal property, Liberec faces several challenges. Some areas have technically inadequate water management infrastructure, and peripheral locations lack public water supply. Additionally, parts of the city have insufficient sewage systems, and the cost of water and sewage services is high. The city has a low share of locally generated electricity, leading to a high dependency on imports. Infrastructure for energy distribution and public lighting is underfunded, and the distribution network is not fully equipped to support individual electricity production and the development of electromobility. In terms of energy sources, about 70% of the electricity produced in the Liberec region in 2019 came from renewable energy sources: 27.1% from solar power, 27% from wind power, and 16% from hydropower. Nearly 80% of the region's total installed capacity is from power plants using ecological resources. The largest energy source in the area is the Teplárna Liberec heating plant, with an output of 12 MWh. The TERMIZO waste incinerator has an installed capacity of 2–3 MWh. Teplárna Liberec and TERMIZO constitute the most extensive central heat supply system, with TERMIZO being a highly efficient cogeneration source capable of providing heat for approximately 17,000 households through the central heat supply network. Over half of Liberec's heat is generated from waste energy, with a huge portion from natural gas. Notably, while natural gas plays a significant role in heat production across the Liberec region, the use of coal for heat production is negligible, which is a positive contrast to the Czech national average.

In the field of **transportation**, relevant data from the 2021 modal split survey conducted during the development of the Sustainable Urban Mobility Plan shows that 40% of trips in Liberec were made by passenger cars, 26% on foot, and 12% by public bus transportation. Other modes had minimal usage: train (0.8%), motorbike (0.4%), taxi (0.1%), and e-bikes (1%). Compared to the overall situation in the Czech Republic, based on data from the Population and Housing Census, Liberec residents walk more than the national average. Regarding infrastructure for sustainable mobility, Liberec has one newly built P+R (Park and Ride) car park and a bike sharing system that includes e-bikes. The public transport bus fleet includes one electric bus and several CNG buses, which account for 36.2% of the fleet (source: 2022 annual report). Developing low-emission transport is crucial for the city's climate-neutrality goals. Therefore, expanding infrastructure for electromobility—covering passenger cars, public transport, and freight transport—is a current priority. The city is also increasingly focused on active mobility, ensuring that Liberec is fully and safely accessible on foot wherever possible. This involves improving public spaces, calming traffic in the city centre, and enabling the safe coexistence of all traffic participants. Efforts include building appropriate infrastructure such as sidewalks, smart and safe traffic signs, crossings, public transport facilities, and cycling lanes.

Climate neutrality commitment and strategic planning

CCC Action Plan covers all city's existing climate action planning. The city's climate ambition is based on current strategic documents, plans, and vision, mainly on the master plan of the city, on the Sustainable Energy and Climate Action Plan, The Local Energy Plan for the City and the Sustainable Urban Mobility Plan. These documents contain measures related to pursuing the climate neutrality. In Liberec, above mentioned documents were developed or updated in a few last years, which was a wonderful opportunity to use both hard, primary, or secondary, data from related analysis, usually based on professional expertise, and "soft" data based on participation and engagement of public (citizens) and other stakeholders. It can be stated that the CCC Action Plan is an umbrella for all main strategic documents and as such replaces, and complements, SECAP - and goes even beyond its goal. CCC Action Plan brings together existing, ongoing, and planned efforts towards climate neutrality, beyond current commitments and besides these, there had to be set up additional measures and actions to be taken in following years (outlined in the action portfolio).

When developing several types of strategic documents, the city engages all key stakeholders, including citizens, municipal organizations, experts, and key players in relevant fields of action all over the city. This approach allows us to utilize data from public hearings, civic forums, surveys, and individual meetings.

In the City climate contract context, no city district was excluded, the whole territory of the city is included.

Moreover, many new challenges, opportunities, barriers, and gaps had to be considered and addressed to approach our climate neutrality ambition in a new way. Achieving climate neutrality is extraordinarily complex and requires intensive collaboration among all stakeholders, not only within the city but also beyond. **This aspect of the process has been crucial and remains the most challenging for Liberec, both now and in the coming years.**

Setting up fully functional, comprehensive, and mutual beneficial system of cooperation with all key stakeholders at local, regional, and national level is a goal that is crucial for the city in following months to be successful in the field of GHG emissions cut.

The city, as a municipality, was not accustomed to effectively cooperating and communicating with all key stakeholders. This means engaging in clear, genuinely participative, and regular collaboration—not just occasional interactions. Before we began working on this action plan, there had been little to no cooperation with most stakeholders from industry. Addressing this gap was a crucial first step in our mission. Recognizing this, we understand the need to build on the current system and evolve it into a truly comprehensive framework for cooperation, communication, education, and collaboration on common activities and projects. To achieve this, we plan to apply for the Enabling City Transformation Call with a proposal focused on building a system that strengthens commitment, increases

understanding and competence, and fosters collaboration across the city. Additionally, we are considering submitting a proposal under the European Urban Initiative's Energy Transition program.

EU Mission – the opportunity for new-way thinking

Thanks to our participation in the mission, new opportunities and possibilities have emerged for the city, with this momentum accelerating as our work on the CCC progressed. These opportunities had three major features: First, as Liberec became more visible—being the only Czech city in the mission—many cities and institutions involved in research and innovation, both from Czechia and across Europe, approached us for collaboration. This opened the door to participation in various research projects, primarily funded by the Horizon Europe/2020 program. Before 2023, the city had never received direct support from the EU through Horizon funding. However, due to our involvement in the mission, we have now joined several research projects, including: Pilot city project "The Initiation of sustainable community energy for the city of Liberec" (as a lead partner of the consortium); ELABORATOR: Designing sustainable urban mobility towards climate-neutral cities (as a consortium partner); TURNAROUNDMONEY: Rethinking municipal finance (as a tested locality); CLIMATEFIT – Resilient Climate Financing and Investment Taskforces (as a tested locality) and other projects/calls/proposals that are currently under consideration.

Another positive impact on the city has been the overall strengthening of municipal capacity, particularly in terms of knowledge and finance. Thanks to the NetZeroCities platform, especially our city advisor, we received a wealth of information, knowledge, and experience through analytics, strategic documents, research works, online meetings, and informal chats with various experts across Europe. We were also provided with information about potential grant schemes, programs, and facilities to enhance our internal capacity in terms of finance and experienced professionals, as well as technical assistance. In this regard, we are interested in participating in the NZC Capital Hub to support the implementation of our City Climate Contract, specifically the investment plan, and to learn new financing methods and approaches to engaging various investors, including private and citizen capital. Our Pilot City project (Community Energy) has enabled us to achieve many synergies. Since the EU Mission does not allocate a specific budget for cities, we utilized the Pilot City budget to the fullest extent possible to increase the city's internal capacity and leverage overlaps. We successfully used the PCP budget and its outcomes to raise awareness about the EU Mission in Liberec and to generate interest among specific stakeholders. For example, community energy became a "tangible" project that initiated communication with vulnerable groups of citizens for both "projects." The PCP also played a significant role in engaging the industry and business sectors, where the clear benefits of community energy concepts facilitated easier communication at the outset. Additionally, we achieved synergies in collecting primary data for monitoring and analysis, which could be used for both "projects."

Another valuable aspect of this experience has been the opportunity to exchange and share our current knowledge in various specific fields, particularly related to our Pilot City project and the development of community energy. As a pioneer city in Czechia committed to climate neutrality, Liberec has attracted

attention. Given our membership in the National Healthy Cities Network and the Community Energy Union, we have been encouraged to share our experience and ambition in this field with other Czech cities. This is an ongoing effort that the city continues to pursue, with the support of the aforementioned networks and in collaboration with relevant Czech ministries. To further these efforts, it is essential to increase the municipal capacity within the transition team.

Following the above-mentioned experiences, searching for additional support at both regional and national levels has become a crucial part of our transition process. Recognizing the importance of this support was an "aha" moment for us. At the beginning of our mission participation, we sought to engage the Ministry of the Environment, which promised additional support in the form of higher subsidy ratios or interest-free loans to help us achieve our goals, provided we obtained the Mission Label. Throughout the past few months, we have communicated with various entities, including the CapaCities manager, the Technology Agency of the Czech Republic, CzechInvest, the Ministry of Industry and Trade, and others. Despite numerous meetings, the recurring question was the specific form of support, whether through a particular project or a specific instrument to be tested. It took some time to realize that such support cannot be occasional; instead, it must be systematic, overarching, and cross-departmental. We also understand that cooperation with the national level must be mutual. This approach involves including ministry representatives in the entire co-creation process within the transition team. Since February 2024, the city has begun regular communication with the Ministry for Regional Development, the Ministry of Industry and Trade, and the Ministry of the Environment. To influence relevant legislation, regulations, and strengthen the city’s position in this field, Liberec also became a member of the Community Energy Union in 2023...

Last but not least, the entire CCC process has enabled us to strengthen our connections at the regional level. We began discussing potential collaborations and addressing capacity gaps, which led to ongoing communication with the Regional Development Agency, particularly in the fields of public education and energy. We also plan to submit a joint integrated project proposal under the LIFE programme, in collaboration with the Regional Office of the Liberec Region. The goal of this project is to build our capacities and hire specialists who would be shared between the municipal and regional offices (the Adaptation Coordinator for example).

Work process on the CCC Action Plan

2022	**Raising climate-neutrality awareness and meeting NZC across the city hall**
	- NZC workshops and webinars (municipal employees' participation) - SNAP participation - Education of leading employees of the City Hall (Climate Fresk workshop) *Output: Stronger Commitment and mission background knowledge at the city level, getting to know each other with NZC*
2022	**Establishment of Transition Team of Liberec**
	- Commission for Climate Neutral Liberec establishment as a formal body, together with building strong mandate and commitment in an informal way as well *Output: Strong mandate for commitment*
2022 - 2023	**Data Collection**
	- Local Energy Strategy development - Baseline Emission Inventory development (completing the data from SECAP) - Stakeholder analysis and other data collection relevant to energy community concepts development and renewables construction *Output: Vision, goals, and summary of measures from existing strategies in Liberec*
2023 - 2024	**Stakeholder Engagement and Participation**
6/2023	**Roundtables for key stakeholders (professional public) - Climate-neutral Liberec and community energy** - facilitated roundtables, where were introduced EU mission and other relevant municipal projects, with key stakeholders were discussed key planned projects relevant to "green transition" and related barriers and threats; discussion about strategic priorities for the CCC commitment
7 – 11/2023	- **individual meetings with key stakeholders** (following roundtables, discussion about key projects, barriers, financial sources, and areas for cooperation
9/2023	-**key stakeholders brainstorming session** (co-creation of the action plan portfolio) – summary of projects/activities arise from above mentioned meetings were scored in all political clubs, which created kind of a synthesis of professional expertise and political priorities
9 - 10/2023	**Civic forums for citizens, one for wide public, another one for youth (primary schools' pupils) - Sustainable development of the city** - facilitated forums, they were discussed key priorities regarding the sustainable development of the city, citizens wrote down their priorities and opportunities for the city, which were scored in the end, the final output was "10 priorities for the sustainable city development"; this result was verified within the online survey that followed the civic forums
6/2024	**Roundtable for public (focus on vulnerable groups of citizens) - Buildings refurbishment, energy poverty, community energy in Liberec** - Facilitated roundtable and workshop, there was introduced the concept of community energy, future social Climate fund by the representatives of the

	Ministry of the Environment, discussion about energy poverty and related issue of insufficient housing services in Liberec, possibility to contribute to this problem via community energy development. *Output: Vision, goals, and measures*
2023 - 2025	**Pilot City Project**
	- Liberec is participating in Pilot City Programme with the project "Initiation of the Sustainable Energy Community for the City of Liberec" the project consortium was created with local heating plant, university, and consulting company - community energy development is a crucial project regarding the CCC goal since there is focus on two emission domains: energy and transportation; it is crucial to build new renewables in the city, to contribute to the issue of energy poverty and deliver necessary social and governance innovation in this field where there citizens are more engaged and have decision-making role. - PCP enabled to strengthen cooperation with key stakeholders representing the project consortium, we plan to continue in further collaboration in new, followed-up projects *Output: Key stakeholders' engagement, increase in capacity for the CCC work, flagship project for the mission*
10/2023 - ongoing	**Transition team education/increase in capacity**
	- workshops for PCP consortium members (held in 11/2023, 1/2024) - planned workshops for public in the field of energy in cooperation with the Regional Development Agency *Output: shared vision, increase in internal capacity of transition team and overall understanding, co-design of the project's portfolio, contribution to MEL*
4/2024 - ongoing	**Cooperation with the regional level**
	- cooperation with the Regional Office of the Liberec region, mainly in the field of education - common integrated project proposal (under THE LIFE programme) to increase internal capacity both at regional and municipal level *Output: shared vision, increase in internal capacities of transition team*
2023 - ongoing	**Negotiation/cooperation with Czech ministries**
	- negotiation about further support for the city of Liberec - to strengthen municipal capacity and commitment - cooperation on establishing national platform (cross-departmental contact place) for Czech cities with climate-neutrality support following the example of other European countries - sharing our knowledge, experience, and best practice with other Czech cities *Output: increase in internal capacities of transition team, sharing best practice across Czech cities*
6/2024 -	**Campaign for citizens raising awareness about climate-neutrality and community energy concepts**
12/2023 – 5/2024	- campaign is based on communication strategy developed within the PCP - public education (aimed at adult citizens and pupils and students from primary and high schools - change in education system in cooperation with the Regional Office of the Liberec Region - online platform development (online platform as the online space for activating potential members of energy community, raising awareness about climate

	neutrality, space for sharing knowledge and best practice, space where can meet professionals including academia *Output: Raised Awareness and understanding (with the aim of behavioural change), shared vision and goals*
1/2024 - 6/2024	**CCC development**
	- synthesis of previous work and data including: - current policies and strategies assessment - CCC Action Plan portfolio design (completion) - transition system and overall environment analysis (with focus on barriers and opportunities) - communication with the NZC and city advisor especially on the CCC draft *Output: Understanding the system, the CCC draft development*
7/2024 - 9/2024	**CCC refinement**
	- final refinement from co-signatories and NZC - submission to the city council (to get the final approvement of the CCC) - social event for all co-signatories *Output: CCC Commitment approval and signature, submission to the European Commission*
10/2024 – 12/2030	**CCC Action Plan implementation**
	- Financing the portfolio (testing new financial instruments including the NZC Capital Hub) - Social and Governance Innovation implementation *Output: Projects' realisation leading to GHG emissions cut*
10/2024 - 12/2030	**Monitoring, Evaluation, Learning**
	- monitoring of the CCC Action and Investment Plan Indicators - evaluation, learning, revision of goals and pathways (learning cycle) *Output: Learning Cycle - CCC Commitment refinement, update based on feedback from MEL*

In cooperation with all key stakeholders, key priorities for the CCC were identified. The focus areas include building refurbishment and the energy sector, the construction of renewable energy sources, the industrial sector, and transportation, with an emphasis on low-emission transport and active mobility support. Since Liberec is still at the beginning of its transformation process, collaboration with frontrunners is also crucial. In the city, this mainly involves the heating plant Teplárna Liberec and large industrial enterprises that are committed to achieving carbon neutrality in the future. Our flagship project centres on the initiation of energy communities within the city, as the sector of buildings and the production and consumption of renewable energy sources are critical according to the baseline emission inventory results. Alongside EPC projects currently under preparation, this initiative could yield significant and visible results for the city, helping to bridge the financial gap in the field of building refurbishment.

This Climate City Contract was developed as a living document that is supposed to be evolved, amended, and improved over time and other stakeholders will be joining this contract and commitment over time.

The city was at the very beginning of its climate neutrality strategic planning when it became one of the mission cities in 2022. Liberec has been a signatory of the Covenant of Mayors since 2016, and while the SECAP was developed afterward, noteworthy progress has been limited. Until now, the primary measures implemented have been on municipal buildings, focusing on those eligible for subsidy funding. These measures included insulation, overall building renovations, and modernizations aimed at energy savings, primarily in kindergartens and primary schools. Currently, several promising projects are either underway or in preparation, including community energy development initiatives such as the construction of a biogas station, EPC projects on municipal buildings, and the installation of photovoltaic systems on municipal building roofs. These projects, combined with EPC measures (energy savings initiatives), are expected to produce meaningful results. In addition, there is a focus on low-emission transport, particularly in connection with community energy development. Plans include the electrification of private passenger cars and freight transport, as well as the electrification of the public transport bus fleet. In addition to electric buses, a sizeable portion of the bus fleet will be powered by biogas produced at the biogas station.

At the beginning of the transition, it was essential to build a strong mandate for action, which took considerable time. A crucial step was appropriately engaging key stakeholders to share the municipal commitment and involve them in the action and investment plan, including their activities and budgets. We organized two roundtables to agree on key priorities and to secure stakeholders' involvement and interests. Following this, individual meetings were held with municipal deputies and key city stakeholders, allowing both sides to share their visions, discuss ongoing and planned projects, identify sources of funding, and address barriers and threats. Key priorities were further validated through two civic forums. Internally, for city employees involved in this process, a "Climate Fresk" workshop was organized to provide education in the field of climate. As we progressed, we reviewed all relevant projects, synergies, and complementarities to accelerate the city's green transition.

In spring 2024, we began deeper collaboration with the Ministry for Regional Development, focusing on mutual efforts, including the establishment of a national platform for Czech cities with climate neutrality ambitions. This process also involved the Ministry of the Environment, the Ministry of Industry and Trade, the Ministry of Education, Youth and Sports, and the National Healthy Cities Network. These institutions have connected the city with valuable professionals, other institutions, projects, and events. We plan to further advance this cooperation as specific projects are implemented over time.

Next steps and outlook:

We need to focus on further development across multiple levels. Based on the results of the baseline emission inventory, our primary focus should be on the buildings and equipment sector. It is essential to define a **long-term strategy for comprehensive building renovations** to meet the requirements of the Energy Performance of Buildings Directive (EPBD IV) and achieve significant emissions reductions. Simultaneously, we must prioritize the **construction of renewable energy sources**, which also involves several layers of action.

Firstly, the city needs to **strengthen its internal capacity**, both in terms of financial resources and the professionals responsible for driving this development forward. Regarding the buildings sector, the city plans to:

- **use all possible funding sources relevant for buildings refurbishment and RES construction.**
    - continue with EPC projects on municipal buildings;
    - use potential of Social Climate Fund fully
    - use other finance opportunities for renewables construction (including private investors and citizens' finance)
- **be focused on sharing all information with wide public, to continue working on long term renovation plan with public, to act as an advisory (technical assistance) body for public for free (to be a contact consultancy point)**
    - to build knowledge, understanding and commitment among politicians, city hall employees and clerks, citizens, and other key stakeholders (improved decision-making based on complex knowledge, behavioural change)
- **learn how to attract private capital, use financial innovations, learn how to develop bankable project proposals and investment plans.**
    - in this field we will use the potential of current projects and instruments fully, i.e. project TURNAROUNDMONEY, CLIMATEFIT, Initiation of Sustainable Energy Community for the City of Liberec, NZC Capital Hub, best practice across the Europe (NetZeroCities Portal)
- **build an innovative and Smart City environment in Liberec.**
    - learn how to use and involve new and smart technologies, innovations,
    - follow good practice from abroad.
    - cooperate in this field with the Ministry of Industry and Trade, CzechInvest Agency and Technological Agency of the Czech Republic, innovative start-ups.
    - cooperate with the Technical University in Liberec as the main centre of science, research, innovation and education in the city.
- **continue to negotiate/cooperate with institutions at the regional level.**
    - to work together on building internal capacity
    - to cooperate in the field of public education, raising awareness about climate-neutrality and promoting relevant projects for wide public in Liberec

- to cooperate with the Regional Development Agency in the field of public education, raising awareness about climate-neutrality and promoting relevant projects for professional public and industry sector in Liberec

- **continue to negotiate/cooperate with institutions at national level.**
  - **t**o negotiate further support for the city in the field of buildings' refurbishment and RES construction finance,
  - to participate in design of new funding programmes and incentives as for example Social Climate Fund and instruments following future strategy on long-term renovation of buildings in the Czech Republic.

Furthermore, we are fully committed to supporting the establishment of a national platform for climate-neutral cities, following the European model and best practices. The city has communicated this initiative with relevant Czech ministries and representatives of the CapaCities project. Our focus is on strengthening the city's capacities, fostering mutual support and cooperation, and building a functional system that can be adopted by other Czech cities. Liberec, on one hand, requires additional support from ministries to enhance its capacity for implementing the CCC Action Plan. On the other hand, the city is ready to share its experience and knowledge with other Czech cities, helping them follow Liberec's example. Another key aspect of our cooperation with Czech ministries and related institutions involves negotiating amendments to legislation and regulations to better facilitate the climate-neutrality transition. Equally important is the need for systematic public education across the country. The current approach to educating young people must be revised to prioritize sustainability. Additionally, adult citizens should receive appropriate education in this area to fully understand the issues and make more sustainable decisions. This also applies to politicians and public administration employees, who must be adequately informed and trained to support this transition effectively.

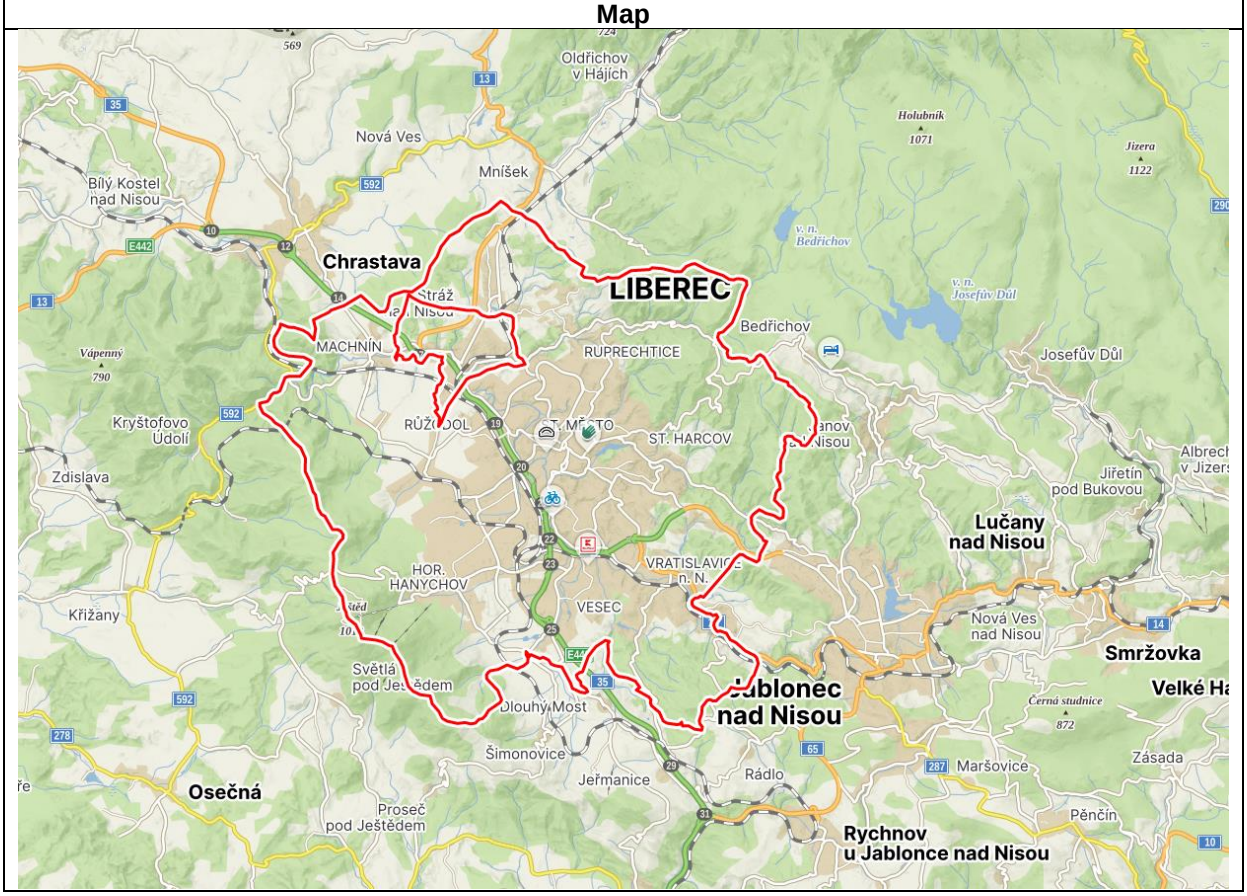
In conclusion, we have determined that the crucial area of action is buildings and facilities. This means that the key stakeholders include building stock owners (primarily households, housing cooperatives, and industry), the Ministry of the Environment (responsible for subsidy programs in this field), the State Environmental Fund of the Czech Republic, and the Ministry of Industry and Trade, which is responsible for the long-term strategy of building refurbishment.

Regarding the current networking, both horizontal and vertical, it can be stated that future iterations of the CCC Action Plan will include more stakeholders (i.e., more signatories of the commitment) and provide more detailed information about the buildings sector. This will align with the forthcoming long-term strategy for building refurbishment, which must be shaped in accordance with the EU Directive and the new Social Climate Fund currently under development. Additionally, linked to the Action Plan portfolio and based on the aforementioned information, the financial sources will be further specified and detailed.

Table 1: Climate Neutrality Target by 2030

Table I-1.1: Climate Neutrality Target by 2030			
Sectors	**Scope 1**	**Scope 2**	**Scope 3**
Stationary energy	All sectors and all greenhouse gases were included.	Emissions of all greenhouse gases from electricity use were included.	None
	None	None	None
Transport	Public city transport, fleet owned by the city and city organisations, private and commercial road transport were included.	Emissions of all greenhouse gases from electricity use were included.	None
	Railway transport was excluded because the city has limited possibilities to influence it.	None	None
Waste/wastewater	Excluded	Not applicable	None
	Since all municipal wastes are burned in the waste to energy plant, there are no significant methane emissions from solid wastes. The emissions from wastes burning are reflected in the heat supplied to the city. The wastewater is processed in wastewater treatment plant with small possibility of further reduction of emissions.	Not applicable	None
IPPU	Emissions of fluorinated gases from production of cooling devices were included.	Not applicable	None
	Other non-negligible emissions sources were not identified	Not applicable	None
AFOLU	Emissions from land use and land use changes are included.	Not applicable	None
	There are no agricultural activities on the city territory and so agricultural emissions are excluded.	Not applicable	None

Other	None	None	None
Geographical boundary	**Same as city administrative boundary**	**Smaller than city administrative boundary**	**Larger than city administrative boundary**
(Tick correct option)	X		
Specify excluded/additional areas	None	None	None
Map			



2 Part A – Current State of Climate Action

This part of the CCC Action Plan describes mainly results of GHG emissions baseline inventory. Our first emission inventory was calculated for SECAP development needs in 2018. This inventory was performed only for chosen sectors and on CO_2 emissions. Emissions were calculated for sectors as municipal buildings, equipment/facilities; tertiary buildings, equipment/facilities; residential buildings; municipal public lighting; urban road transportation: municipal fleet, public transportation, private and commercial transportation (part of it – included roads owned by the city); urban rail transportation (tramways and local trains). This inventory was updated in 2022 and because of pandemic covid situation (to avoid the data distortion) the emissions were calculated for year 2019. Since above mentioned sectors and type(s) of GHG emissions were not complete for the CCC Action Plan scope, we needed to complete the baseline emission inventory, to complete sectors and types of GHG emissions. This inventory was calculated in 2023 and to be able to link this data with the data from updated SECAP, the inventory was calculated for year 2019. All mentioned calculations, observations and estimations were performed by the Enviros company that was an external advisory body in case of both SECAP and CCC development.

2.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

This part of the action plan describes 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.

Table A-1.1 shows Final energy use by source sectors:

Table 2: Final energy use by source sectors

A-1.1: Final energy use by source sectors				
Base year	**2019**			
Unit	**MWh/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Buildings	**1 001 503**	**627 451**	**-**	**1 628 955**
Ambient heat	5 832			5 832
Biogas	11 814			11 814
Diesel fuel	228			228
Electricity		627 451		627 451
Fuel oil	7 905			7 905
Wood	78 296			78 296
Hard coal	14 635			14 635
Heat	178 262			178 262
Lignite	37 279			37 279
LPG	2 306			2 306
Natural gas	664 466			664 466
Solar thermal	480			480
Transport	**334 531**	**6 410**	-	**340 941**
Biofuels	13 283			
Diesel fuel	192 325			
Electricity		6 410		
Gasoline	116 831			
LPG	1 998			
Natural gas	10 093			
Waste	**0**	**0**	**0**	**0**
Industrial Process and Product Use (IPPU)	**0**	**0**	**0**	**0**
Agricultural, Forestry and Land Use (AFOLU)	**0**	**0**	**0**	**0**

Table A-1.1 shows that the highest final energy use was in the sector of Buildings, when we focus on total use (all scopes), the highest use was connected with use of **electricity** and **natural gas**.

This table is followed by A-1.1 Details on buildings since buildings were the sector with the highest use of energy.

Table 3: Final energy use by source sectors – details on buildings

A-1.1: Final energy use by source sectors - details on buildings				
Base year	**2019**			
Unit	**MWh/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Agriculture	**4 726**	**336**		**5 062**
Electricity		336		336
Natural gas	4 726			4 726
Industry and construction	**233 611**	**280 883**		**514 494**
Biogas	11 814			11 814
Diesel	11			11
Electricity		280 883		280 883
Fuel oil	2 906			2 906
Heat	20 224			20 224
Lignite	7 112			7 112
Natural gas	191 544			191 544
Residential buildings	**481 614**	**151 788**		**633 402**
Ambient heat	5 026			5 026
Electricity		151 788		151 788
Fuel oil	1 559			1 559
Hard coal	14 635			14 635
Heat	95 511			95 511
Lignite	28 348			28 348
LPG	2 198			2 198
Natural gas	255 606			255 606
Solar thermal	435			435
Wood	78 296			78 296
Municipal buildings and equipment	**60 967**	**16 133**		**77 100**
Electricity		16 133		16 133
Fuel oil	308			308
Heat/cold	40 277			40 277
LPG	108			108
Natural gas	20 274			20 274
Public lighting	**0**	**6 243**		**6 243**
Electricity		6 243		6 243
Tertiary buildings and equipment	**220 586**	**172 068**		**392 654**
Ambient heat	806			806
Diesel	217			217
Electricity		172 068		172 068
Fuel oil	3 132			3 132
Heat	22 250			22 250
Lignite	1 819			1 819
Natural gas	192 316			192 316
Solar thermal	45			45

Above mentioned table shows that in sector of buildings, the highest use of energy was in residential buildings and in terms of energy source the highest share had natural gas followed by electricity. Residential buildings are followed by Industry and construction sector where there was observed the highest use of electricity followed by natural gas.

Regarding the final energy use by sources sectors, following tables shows the sector of Transport, detailed information on municipal fleet, public transport, and private and commercial road transport.

Table 4: Final energy use by source sectors – details on municipal cars

A-1.1: Final energy use by source sectors - details on municipal cars				
Base year	**2019**			
Unit	**MWh/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Gasoline	**137**	**0**	**0**	**137**
fossil fuel	131			131
Biofuel	6			6
Diesel	**324**	**0**	**0**	**324**
fossil fuel	306			306
Biofuel	18			18
Electricity	**0**	**30**	**0**	**30**

It is obvious that municipal fleet needs to be completely renewed and electrified. There are still municipal cars using fossil fuels and we are aware that city needs to be frontrunner and good role-model in this field.

Table 5: Final energy use by source sectors – details on public transport

A-1.1: Final energy use by source sectors - details on public transport				
Base year	**2019**			
Unit	**MWh/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Diesel	**10 938**	**0**	**0**	**10 938**
fossil fuel	10 319			10 319
Biofuel	619			619
CNG	**8 782**	**0**	**0**	**8 782**
Electricity	**0**	**6 380**	**0**	**6 380**

The table detailing public transport indicates that the current fleet includes both diesel and CNG buses, with trams utilizing electricity. Regarding public buses, the city needs to continue greening its fleet by incorporating more low-emission vehicles. In 2023, electric buses were tested, but due to inadequate (slow) charging infrastructure and the city's hilly terrain, this option was not deemed effective. The city plans to continue using CNG buses, particularly since a biogas station will soon be operational in Liberec and will be connected to the main transport company via a community energy network. This approach has been assessed as the most effective way to reduce emissions in public transport.

The possibility of using hydrogen as a fuel for public transport was considered, but the technology is currently too expensive. Moreover, the challenge lies in the requirement to use only green hydrogen.

Although our heating plant could produce a significant amount of grey hydrogen, this option is not aligned with the necessary legislation.

Table 6: Final energy use by source sectors – details on private and commercial road transport

A-1.1: Final energy use by source sectors - details on private and commercial road transport				
Base year	**2019**			
Unit	**MWh/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Light freight vehicles				
Gasoline	**106**	**0**		**106**
fossil fuel	100			100
Biofuel	6			6
Diesel	**35 477**	**0**		**35 477**
fossil fuel	33 800			33 800
Biofuel	1 677			1 677
CNG	**638**	**0**		**638**
Heavy freight vehicles				
Diesel	**9 039**	**0**		**9 039**
fossil fuel	8 612			8 612
Biofuel	427			427
Passenger vehicles				
Gasoline	**117 012**	**0**		**117 012**
fossil fuel	113 486			113 486
Biofuel	3 526			3 526
Diesel	**100 150**	**0**		**100 150**
fossil fuel	95 417			95 417
Biofuel	4 733			4 733
CNG	**1 998**	**0**		**1 998**
LPG	**673**	**0**		**673**

Table A-1.1 provides details on private and commercial road transport, showing that passenger cars powered by fossil fuels, such as gasoline and diesel, have a significant impact. Freight vehicles also contribute notably to energy use in private transport. It is crucial to continue the electrification of private vehicles and to support this transition by developing appropriate infrastructure. Additionally, engaging with industry and private companies is essential to address the electrification of freight transport. Public education plays a vital role in transforming decision-making processes toward more sustainable choices. We need to encourage citizens to prefer public transport and make conscious, environmentally friendly decisions.

Table A-1.2 present emission factors applied in calculations.

Table 7: Emission factors applied.

A-1.2: Emission factors applied						
(please specify for primary energy type and GHG emission factor according to methodology used)						
For calculation in t or MWh of primary energy						
IPCC emission factors according to SECAP mythology						
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)**
Residential buildings						
electricity	0,607	1,066E-05	5,823E-06			
fuel oil	0,276	1,800E-05	3,600E-07			
fuel wood	0,000	1,078E-03	1,434E-05			
hard coal	0,329	1,080E-03	5,400E-06			
heat	0,317	1,371E-04	1,691E-05			
lignite	0,357	1,080E-03	5,400E-06			
LPG	0,226	1,800E-05	3,600E-07			
natural gas	0,201	1,800E-05	3,600E-07			
Municipal and tertiary buildings and equipment						
diesel fuel	0,267	2,455E-05	1,008E-06			
electricity	0,607	1,066E-05	5,823E-06			
fuel oil	0,276	2,455E-05	1,008E-06			
heat	0,317	1,371E-04	1,691E-05			
lignite	0,357	1,080E-03	5,400E-06			
LPG	0,226	2,455E-05	1,008E-06			
natural gas	0,201	1,800E-05	3,600E-07			
Industry and construction						
biogas	0,000	3,600E-06	3,600E-07			
diesel fuel	0,267	8,846E-06	1,672E-06			
electricity	0,607	1,066E-05	5,823E-06			
fuel oil	0,276	8,846E-06	1,672E-06			
heat	0,317	1,371E-04	1,691E-05			
lignite	0,357	3,211E-05	4,795E-06			
natural gas	0,201	3,600E-06	3,600E-07			
Agriculture						
electricity	0,607	1,066E-05	5,823E-06			
natural gas	0,201	1,800E-05	3,600E-07			

A-1.2: Emission factors applied						
Public lighting						
electricity	0,607	1,066E-05	5,823E-06			
Public transport						
biofuels	0,255	5,367E-06	1,265E-05			
CNG	0,201	1,945E-04	6,338E-06			
diesel fuel	0,267	4,598E-06	1,092E-05			
electricity	0,607	1,066E-05	5,823E-06			
Municipal cars						
biofuels	0,255	2,167E-05	9,177E-06			
diesel fuel	0,267	9,137E-07	9,847E-06			
electricity	0,607	1,066E-05	5,823E-06			
gasoline	0,249	3,384E-05	3,367E-06			
Private and commercial road transport - light freight vehicles						
biofuels	0,255	2,836E-06	8,288E-06			
CNG	0,201	8,281E-05	1,534E-06			
diesel fuel	0,267	5,960E-07	7,246E-06			
gasoline	0,249	2,496E-05	3,897E-06			
Private and commercial road transport - heavy freight vehicles						
biofuels	0,255	5,367E-06	1,265E-05			
diesel fuel	0,267	4,598E-06	1,092E-05			
Private and commercial road transport - passenger vehicles						
biofuels	0,255	2,167E-05	9,177E-06			
CNG	0,201	8,281E-05	1,534E-06			
diesel fuel	0,267	9,137E-07	9,847E-06			
gasoline	0,249	3,384E-05	3,367E-06			
LPG	0,226	3,456E-05	5,545E-06			

Based on energy use and emission factors presented above, following tables show GHG emissions:

Table 8: GHG emissions by source sectors

A-1.3: GHG emissions by source sectors				
Base year	**2019**			
Unit	**t CO_2equivalent/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Buildings	216 800	382 191	**-**	598 991
Transport	87 143	3 905	**-**	91 048
Waste	-	**-**	**-**	0
Industrial Process and Product Use (IPPU)	34 605	**n/a**	**-**	34 605
Agricultural, Forestry and Land Use (AFOLU)	16 069	**n/a**	-	16 069
Total	**354 617**	**386 096**	**-**	**740 712**

Table A-1.3 shows that highest share of GHG emissions was produced in the sector of buildings. Higher use in scope 2 is caused by the use of electricity. In the sector of waste, there were calculated zero emissions because of used methodology where there since there is the incinerator in Liberec, emissions from waste are calculated in sector of buildings in total.

Above mentioned data are presented in a more details below:

Table 9: GHG emissions by source sectors in detail

Base year	**2019**		
Unit	Emissions (t)		
	CO2	CH4	N2O
BUILDINGS	591 925,00	173,57	8,32
Municipal buildings and equipment	26 735,00	6,07	0,78
Tertiary buildings and equipment	151 765,00	10,39	1,46
Residential buildings	**189 659,00**	150,20	3,95
Public lighting	3 791,00	0,07	0,04
Industry and construction	**218 821,00**	**6,75**	**2,09**
Agriculture	1 154,00	0,09	0,00
TRANSPORT	90 202,52	6,48	2,50
Public transport	8 552,60	1,83	0,21
Private and commercial road transport	**81 511,00**	4,65	2,29
Municipal cars	138,92		
WASTE	-	**-**	**-**
IPPU	34 605,00	-	-
AFOLU	16 068,68	-	-

Table shows that highest level of emissions is produced in buildings from industry and construction sector, followed by residential buildings and tertiary sector buildings. Then there is transport sector, where there is highest impact of private and commercial road transport in terms of passenger cars and light freight vehicles.

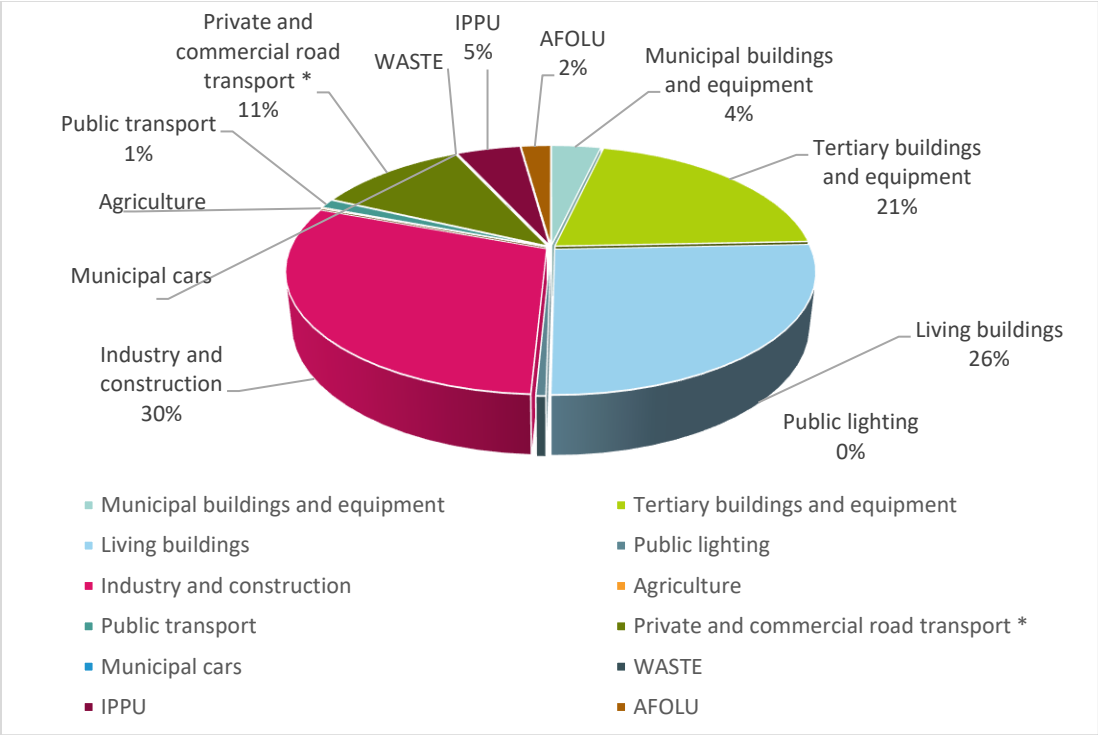
Table 10: Activity by source sectors

A-1.3: Activity by source sectors

Base year	2019		
	Scope 1	Scope 2	Scope 3
Buildings	-	-	-
Transport			
Private and commercial road transport			
Light freight vehicles			
Gasoline [vhkm]	3 872		
Diesel [vhkm]	37 202		
CNG [vhkm]	609		
Heavy freight vehicles			
Diesel [vhkm]	21 980		
Passenger vehicles			
Gasoline [vhkm]	169 840		
Diesel [vhkm]	145 368		
CNG [vhkm]	989		
LPG [vhkm]	2 935		
Waste	-	-	-
Industrial Process and Product Use (IPPU)	-	-	-
Agricultural, Forestry and Land Use (AFOLU)			
forest land remaining forest land [ha]	4 241,8		
cropland converted to forest land [ha]	1,4		
cropland remaining cropland [ha]	1 731,8		
grassland remaining grassland [ha]	1 949,8		
settlements remaining settlements [ha]	2 587,1		
cropland converted to settlements [ha]	8,5		
grassland converted to settlements [ha]	16,7		

Visualization of results

Following charts and pictures shows conclusions and results and comparison over time.



Picture 1 CO_2 emissions by source sectors

Picture shows visualisation of results described above. Most CO2 emissions come from Industry and construction sector buildings (30 %), this sector is followed by residential buildings (26 %) and tertiary buildings (21 %).

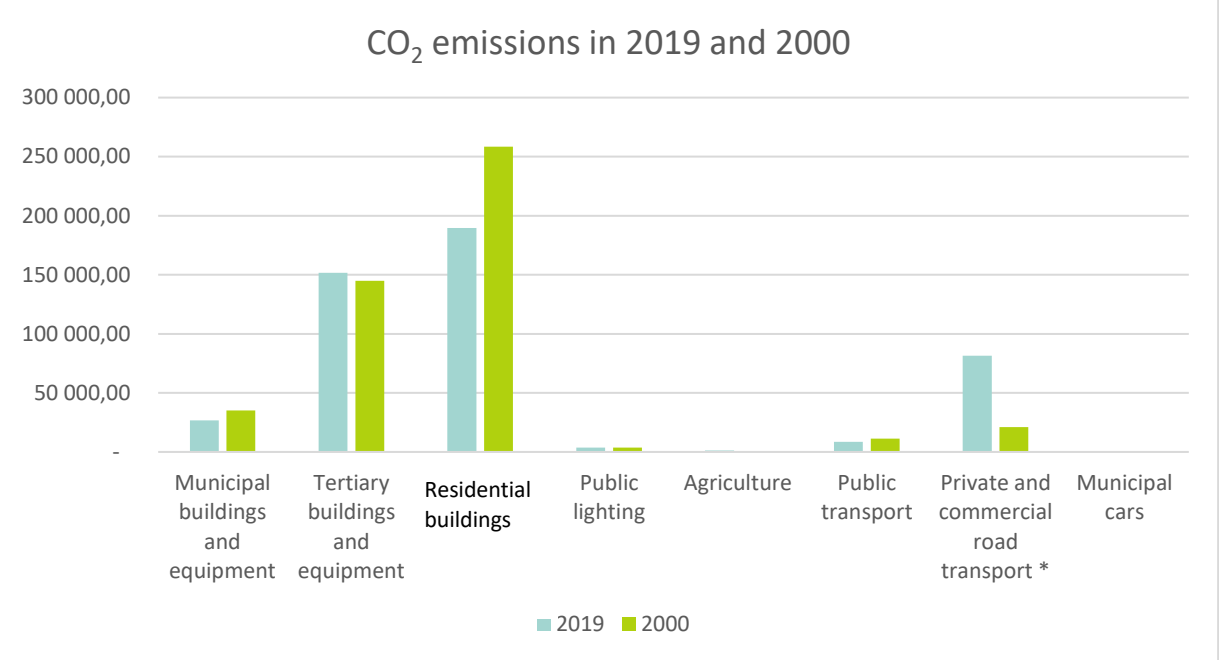
Comparison over time

Table 11: Emissions by source sectors – comparison between 2000 and 2019

	Emissions (t CO_2)	
Sector/Base year	2019	2000
Municipal buildings and equipment	26 735,00	35 122,00
Tertiary buildings and equipment	151 765,00	144 918,00
Residential buildings	189 659,00	258 396,00
Public lighting	3 791,00	3 811,00
Industry and construction	218 821,00	n/a
Agriculture	1 154,00	602,00
Public transport	8 552,60	11 133,00
Private and commercial road transport *	81 511,00	20 905,00
Municipal cars	138,92	96
WASTE	n/a	n/a
IPPU	34 605,00	n/a
AFOLU	16 068,68	n/a

** In 2000 there was not included transport on state and region-owned roads, only on local ones, and electromobility. Also only CO_2 was monitored, not other types of GHGs, the table still shows the difference, is relevant for comparison over time.*

Following picture shows comparison of emissions level over time, in year 2019 compared to 2000.



Picture 2: CO_2 emissions – comparison over time (baseline year 2000)

Assessment and description

The data presented above on emissions is a synthesis from the SECAP and the baseline emission inventory, which supplemented the SECAP results. Both sets of data and calculations are valid for the year 2019. The SECAP did not include all mandatory sectors and GHG types, necessitating the completion of the emission inventory. To maintain consistency and avoid data distortion caused by the impacts of COVID-19, 2019 was chosen as the best baseline year for this purpose.

When we examine the data, it is clear that the city achieved the goal set by the Covenant of Mayors, namely a 20% reduction in CO2 emissions by 2020 compared to the 2000 baseline year. A closer look at the reduction across all included sectors reveals that this decrease was primarily driven by changes in the household sector, as illustrated in the following picture.

Final consumption - households [MWh]	2000	2005	2010	2015
Natural gas	146,792	189,934	172,683	197,414
Electricity	146,358	156,731	154,422	143,503
Heat	239,051	194,753	151,658	102,107
Heating oil	1,764	1,879	1,909	1,562
Oil	0	0	0	0
Propane - Butane	848	1,085	1,213	2,398
Lignite	57,382	47,006	42,407	38,084
Bituminous coal	240	232	236	12
Coke	1,471	949	370	46
Biofuel	9,393	21,245	28,493	24,307
Solar heat	0	0	98	399
Geothermal heat	86	713	2,712	4,394
Total	**603,385**	**614,528**	**556,201**	**514,225**

Source: Calculation of ENVIROS

Picture 3: Final energy consumption in households (corrected to normal climatic conditions)

In recent years, many households have benefited from refurbishment subsidies aimed at replacing energy sources and insulating buildings, such as those provided by the Green Savings program and boiler subsidies for the replacement of solid fuel boilers. The boiler subsidies were particularly significant, targeting low-income households and covering a high percentage of eligible expenses. The supported types of heating systems included gas condensing boilers, electric and gas heat pumps, and biomass boilers. These initiatives were the primary drivers of emissions reduction in Liberec. Additionally, new housing construction and improvements in the energy performance of existing apartments have also contributed to the reduction in emissions in recent years.

Specific measures designed in households are presented by following table:

Measure	Implementation costs incl. VAT [thousand CZK]	Reduction of CO_2 emissions in 2020 [t/y]	Reduction of CO_2 emissions in 2030 [t/y]	Specific investments in emission reduction [CZK/t CO_2]
Thermal insulation of residential buildings	4 533 354	1 389,2	27 783,5	163 167
Thermal insulation of family houses	1 680 192	765,9	15 317,9	109 688
Excluding remaining coal boilers from households	450 000	317,3	6 346,1	70 909
Old gas boilers replacement in households	240 000	72,0	2 398,5	100 061
Light fitting replacement by LED in households	13 000	173,3	3 465,5	3 751
Replacement of domestic electrical appliances	85 000	64,9	1 298,0	65 483
Convection heater replacement by heat pumps	56 000	0,0	1 913,9	29 260
Total (for specific investments – average)	**7 057 546**	**2 782,5**	**58 523,5**	**120 593**

Picture 4: Measures designed in households

The table provides a detailed breakdown showing that the most significant emissions reductions were achieved through thermal insulation of buildings, the exclusion of remaining coal boilers from households, the replacement of lighting with LED fittings, and the upgrading of domestic electrical appliances. Thermal insulation measures for residential buildings and family houses included improvements to the operational efficiency of heating systems and enhancements to the thermal resistance of key building structures. Moving forward, it is crucial to complete the refurbishment of the remaining buildings. The city should play an active role in this process by simplifying permitting procedures to the maximum extent, promoting awareness, and providing consultancy services to support residents in implementing these energy-saving measures.

Recent energy efficiency measures implemented in the housing stock have primarily focused on retrofitting existing panel housing through thermal insulation and window replacement. This effort has also extended to the retrofitting of older brick houses, funded mainly by the Czech Savings Bank and the Integrated Regional Operating Programme. Additional measures include thermal insulation and the use of renewable energy sources (RES) in family houses, supported by the New Green Savings Programme. Other significant initiatives include the retrofitting of heat sources, insulation and upgrading of heating systems, installation of building exchange stations, and enhancement of technical equipment. Furthermore, there has been support for new residential construction aimed at specific target groups, such as retirees, people in need, and youth leaving children's homes, ensuring these new buildings meet low-energy standards.

In addition to residential buildings, many municipal buildings, particularly primary schools, and kindergartens, were completely refurbished. This was made possible through subsidies from the Operational Programme Environment.

The following picture illustrates the energy performance of buildings based on their construction period, taking into account any retrofits that have been implemented. The potential for energy savings was calculated by comparing the specific energy consumption for space heating in existing buildings with the new standard requirements for thermal protection of buildings. The calculated heat consumption for

space heating in 2015 corresponds to the energy consumption data for space heating, which is assumed to represent 60–70% of the total energy consumption in households.

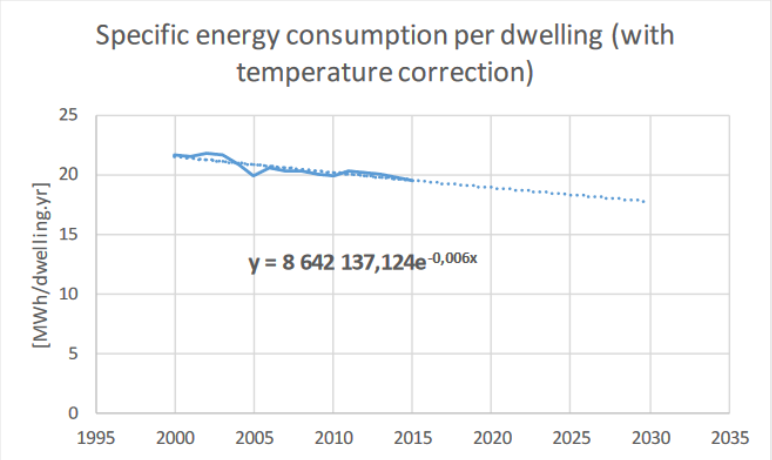
PERIOD OF CONSTRUCTION		Specific energy consumption – existing housing stock [kWh/m^2. year]		
		Original in the period of construction	After measures 2015	After measures 2030
Family houses	< 1920	250	145	90
	< 1970	280	145	90
	1971 – 1980	220	130	90
	1981 – 2000	170	100	80
	2001 – 2011	130	95	80
Residential and other buildings	< 1920	170	135	110
	< 1970	170	130	60
	1971 – 1980	170	80	40
	1981 – 2000	160	80	40
	2001 – 2011	110	80	60

Source: ENVIROS, s.r.o.

Picture 5: Energy performance of buildings according to period of construction considering implemented retrofits

The potential calculation for 2030 comes from the assumption that buildings retrofits will meet the requirements of 730540-2:2011 CSN Standard and the legislative requirements for energy performance of buildings. According to the current legislation, as of 2021 building retrofits will require achieving cost-optimal specific indicator level, which complies with the requirement of 730540-2:2011 CSN Standard and legislative requirements for energy performance of buildings pursuant to Act 406/2000 Coll. as amended. We assume that in 2030 the buildings retrofits will have to meet the recommendation of 730540-2:2011 CSN Standard and the legislative requirement for energy performance of buildings. The specific indicators used for the reference are then correspond to these values.

The reduction in energy consumption in existing dwellings, resulting from decreased energy intensity, will offset the increase in energy consumption caused by new construction. The following figure illustrates the reduction in specific energy consumption per dwelling from 2000 to 2015.



Source: ODYSSEE Database (http://www.indicators.odyssee-mure.eu/energy-efficiency-database.html)

Picture 6: Development of specific energy consumption per dwelling in the Czech Republic

Comparison of emission production in road transport in last year including prognosis for 2030 (BAU scenario from SECAP from 2018, no fuel change taken into consideration) presents following picture:

Vehicles by owner	2000	2005	2010	2015	2020	2030
Vehicles owned by the City and its institutions	96	129	100	101	98	48
Public transport vehicles	11,133	8,307	9,894	8,468	7,982	8,221
Private and commercial vehicles	53,336	66,797	63,684	67,033	78,577	84,413
Sum total	**64,565**	**75,234**	**73,678**	**75,602**	**86,658**	**92,683**

Picture 7: Total annual CO_2 emission production in road transport [t]

There is a clear reduction in emissions in public transport due to the purchase of low-emission vehicles. However, this transition needs to be fully completed, with the transport company transforming its fleet entirely to zero-emission and low-emission vehicles. In contrast, emissions from private and commercial vehicles have increased, as the number of passenger cars continues to rise over time, with only minimal shifts in fuel types (electrification).

2.2 Module A-2 Current Policies and Strategies Assessment

Following part list all relevant policies, strategies, initiatives, or regulations at local, regional, and national level.

In general, there can be stated that when developing new local strategic documents, there is always paid attention to compliance both with regional and national documents and policies and sectoral strategies connections as well.

This CCC Action Plan aims to cover all valid strategic documents, current climate commitments and to be an umbrella document for the city's ambition to become climate-neutral city.

Module A-2 "Current Policies and Strategies" lists and assesses relevant existing policies, strategies, initiatives, or regulation at local, regional, and national level. Following table includes also the evaluation of the given strategy importance to the city climate commitment on a scale from 1 to 3, where 1 represents the lowest importance and 3 the greatest importance in terms of this document ambition.

In the field of suggested actions in relation to presented strategies, this part is developed in a more detail in the Module C-1. In general, there are many strategic documents aiming at the same problems, covering all fields of action. Overall problem is the phase of documents' implementation, which is a problem of available public and private funds deployment, financial innovation testing, developing investment cases, broad public participation including citizens' capital, issue of multi-level governance etc.

This assessment contributes to identification of the gap between the emissions reduction due to existing initiatives and the city's 2030 climate neutrality target. Filling this gap by identifying additional actions and levers to achieve the city´s emission reduction target is the focus of this Action Plan.

The assessment of current policies and strategies offers hence a starting point for exploring the impact pathways (Part C).

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
(regulation/ policy/ strategy/ action plan	(local, regional, national, EU)	(Name of policy/ strategy/ plans)	(Description of policy/ strategy/ plans)	(Describe relevance/ impact on Liberec climate neutrality ambition)	(list any suggested action in relation – to be further picked in Module C-1)
Strategy	local	Development Strategy of the Statutory City of Liberec 2021+ (2022)	Main strategic document for the city aiming at overall municipal development. There are four strategic goals including Sustainable development of the city. This strategy will be implemented via the action plan developed for two years.	3	All strategic documents that are mentioned in this section are connected with measures relevant to mitigation and adaptation. When developing the CCC Action Plan, we revised all documents mentioned here, all relevant measures that have not been realized were moved to the CCC Action Plan portfolio, projects from SECAP, Local Energy Strategy and Integrated Territorial Investment Strategy. There can be stated that there is a common barrier for enabling successful implementation of those strategies and policies. First, there is crucial **to increase internal capacity of the city, both in terms of finance and number and quality of professionals working for the city**. Currently, there is lack of finance for implementation of those documents, which is common situation for almost all cities and furthermore, Liberec is quite indebted city. In case of number of professionals contributing to strategic documents implementation, we already submitted the EUCF proposal to be able to pay for finance specialist who would help to implement the CCC Investment Plan. Furthermore, there is a new position of **CCC coordinator**, there will be new position of the **Adaptation Coordinator**, both of them will be
Strategy	local	Sustainable Energy and Climate Action Plan (SECAP) (2018, updated in 2022)	Strategic document including the Baseline Emission Inventory for selected sectors, and which monitors the CO_2 level and measures leading to climate commitment (emission reduction by 40 % by 2030).	3	
Strategy	local	Adaptation Strategy (2023)	Strategic document including adaptation measures and the action plan for the implementation	2	
Strategy	local	Sustainable Urban Mobility Plan for the Agglomeration of cities Liberec – Jablonec nad Nisou (SUMP) (2022)	Strategic document designing measures leading to calming the city centres down, to public space re-design/shaping leading to sustainable mobility support.	3	
Strategy	local	Local Energy Strategy (2023)	Strategic document developing measures in the field of energy and contributing to higher self-sufficiency and safety based on		

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			principles of climate neutrality, community energy and efficiency.		responsible, together with **Finance Specialist**, to increase the possibility of projects' implementation, to search for new ways of funding, which is crucial - to learn how to use multi-source finance, how to involve private capital, PPP, PPA, financial innovation, how to write bankable investment plan/concept. As was mentioned, to overcome the finance gap in general, there should be a position of finance expert who shall cooperate mainly with the CCC coordinator (and financial sector). Part of this work is negotiation at national level. In this field, we also expect to **increase our knowledge and experience** via NZC Capital Hub and via relevant Horizon projects where Liberec participates as TURNAROUND MONEY and CLIMATEFIT. Successful implementation of measures is also influenced by political priorities, participation of public and their opinion, by employees of the city hall – this means by their priorities and quality and complexity of all information behind the decision-making process. For this reason is important to educate all stakeholders – politicians, employees, and clerk across the city hall, public – citizens, professional public. To educate, to raise awareness about importance of those measures, understanding and willingness to work together, share the common vision of climate-neutral and sustainable city.
Strategy	local	Integrated Territorial Investment Strategy of Liberec – Jablonec nad Nisou agglomeration (2022)	Strategy designing integrated strategic measures, projects, with significant impact on the whole locality	2	
Policy/Regulation	local	Manual of public spaces for the city of Liberec – blue-green infrastructure	This manual consists of measures supporting development of sustainable and resilient, climate-neutral city. The sense of this document is to collect simple, however long-term, and high-quality solutions developing the city and creating welcoming public spaces. The aim is to set up comprehensible rules for designing and reconstruction public spaces. It provides methodological instructions for designers and decision makers in the city and thus, the aim is to save time and municipal budget. This manual complements the Adaptation strategy.	3	

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
Strategy	local	Municipal Waste Management of the City	Mandatory document for the city, developed in line with national legislation defining municipal waste management	1	This document and its implementation is in line with the Act on Waste No. 541/2020 Coll., which defines that city producing more than 1000 t of communal waste needs to develop such document mandatory and is a basis document for municipal spatial planning. For implementation of this plan, city contracts private company to ensure its realization.
Strategy	local	Spatial Plan of the City	Document developing goals of municipal spatial planning, designing basic urbanistic concept of the locality development, determining built-up areas and corridors. In the context of this CCC Action Plan sets conditions for RES construction	3	Spatial plan is crucial for strategic planning in the field of climate agenda, mainly in case of planning of renewable sources construction since there are defined zones where there RES can be constructed, it is also precondition for acceleration areas for renewables.
Strategy	local	General of Bicycle Transport of the City	Document developing cycling in the city, it is a background for cyclists' requirements application when investment preparation and infrastructure building	2	This document was covered by the Sustainable Urban Mobility Plan, crucial for successful realization are the same conditions as mentioned above. Biggest problem for building new cycling lanes in Liberec, except finance, is the necessity of buying real estate from private owners (negotiation that takes a lot of time), re-routing of networks and issue of traffic safety on roads for all users – overall development of cycling infrastructure, telematics, bike sharing development etc.
Policy/Regulation	local	Manual of public spaces for the city of Liberec - urban surfaces	Document supporting municipal development in terms of innovative approach to public spaces (taking into account the cultural-historical, social, economic, and natural-landscape context of Liberec)	2	To share these documents to relevant stakeholders, to use them in the field of public education as well, to increase financial resources for successful implementation.

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
Policy/Regulation	local	Municipal principles for construction in the city	Set of rules and recommendations aimed at cultivating a construction culture in the city	1	
Policy/Regulation	local	Principles for cooperation with investors on the development of public infrastructure	Set of rules for negotiating the location of investment projects in the city	1	
Regulation	local	Decree of the city establishing the setting of the municipal system of waste management and management of construction and demolition waste in the city	The decree lists types of waste and proper sorting, information on municipal waste collection and obligations.	1	This document is implemented in line with specific law, what is important is to go beyond this document in the field of re-use and circular economy.
Strategy	regional	Master Development Strategy of the Liberec Region 2021-2027	Strategy is the main regional conceptual document. of the Liberec region for the period of 2021-2027. Its aim is to propose activities and measures, which will lead to the fulfilment of regional policy goals stated both at the EU and national level, but above all to eliminate problems, to fulfil needs and sustainable development of the entire Liberec region.	2	To meet the goals, it's important to increase regional capacity, to increase financial resources and internal knowledge and number of employees responsible for the implementation, in many cases, there is necessary to change, amend, propriate Czech legislation first, to clarify competences and to cooperate more with key stakeholders on all levels, including local, regional, national.

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
Strategy	regional	Update of the Regional Annex to the National RIS3 for the Liberec Region 2021-2027	The Regional Annex to the National Research and Innovation Strategy for Intelligent Specialization of the Czech Republic for the territory of the Liberec Region (hereafter Regional RIS3) is part of the conceptual framework for oriented and applied research in the Czech Republic and the setting of conditions for the purposeful targeting of European, national regional and private financial resources in the period 2021+ into prospective, knowledge-intensive specializations. The purpose is to support economic growth and transformation towards a knowledge-based economy, to strengthen the competitiveness and prosperity of the regional economy in an international context, and to contribute to the solution of current social challenges	2	
Strategy	regional	Smarter region for the Liberec region (2019)	Long-term concept to guide the future activities in the field of using smart technologies in Liberec region. First, there were involved regional key stakeholders for defining the most important topics, priorities and problems, afterwards specific measures and activities leading to increase in the regional attractiveness in terms of better	2	

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			conditions for life, work, and business, and to increase in people's competences for using smart technologies in everyday life.		
Strategy	regional	Strategy of environmental public education and enlightenment in the Liberec Region 2021-2030	The concept of environmental education is a strategic document fulfilling the independent jurisdiction Act No. 123/1998 Coll. on the right to information about the environment (§ 13, paragraph 5). This regional strategy follows the key national strategy, which is the State Program of Environmental Education, and Enlightenment and Environmental Consulting 2016 - 2025.	1	
Strategy	regional	The nature and landscape protection strategy of the Liberec region, update 2021+	This strategy is a strategic document for nature and landscape protection at the regional level. This document, based on the analysis of the state of nature and landscape, trends of the territory, formulates goals, tasks, and measures for the period 2021+, which should contribute to maintaining a favourable state of nature and landscape as well as to its improvement and development.	1	
Policy/strategy	regional	Waste management plan for Liberec Region 2016-2025	Long-term document, with the aim to determine the optimal way to achieve compliance with the requirements of the legislation of the Czech Republic and the EU in the area of waste management in	2	

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			the territory of the Liberec region and the associated economic impacts.		
Strategy	regional	Strategy for the development of bicycle transport in the Liberec Region 2021+	Strategic document designing the visions, strategic goals, measures, and activities that the Liberec Region wants to support in the area of cycle transport and cycle tourism. The cycling strategy is aimed at supporting cycling transport and guides cities and micro-regions to not deal with cycling transport in isolation, but on the contrary integrated together with other modes of transport, and above all uniformly within the integrated strategic document of the relevant region.	2	
strategy	regional	Territorial energy strategy of the Liberec region (2010) [updated in 2015]	The territorial energy strategy defines the conditions for economical use of energy in accordance with the needs of economic and social development, including environmental protection and careful use of natural energy sources. The territorial energy strategy was developed for a period of 25 years and is based on the State Energy Concept.	2	
Action plan	regional	Action plan for adaptation to climate change in the conditions of	Through this document, specific measures of the Master development Strategy of the Liberec Region for the period 2021+ in the area of adaptation to	3	

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
		the Liberec region (2021)	climate change and climate-responsible policy and public administration of the region will be implemented. The Liberec region wants to intensify the policy of climate protection and adaptation to climate change through this action plan. The purpose is to increase the preparedness of the region and its inhabitants to face long-term drought, river floods, heavy rainfall, and floods, increasing temperatures and their extremes and extraordinary weather fluctuations. Measures will be proposed in all sectors in relation to the region's development strategy, which will reduce vulnerability and increase the adaptive capacity of the region. In all cases the region will give priority to adaptation measures that will also reduce greenhouse gas emissions. In order to reduce the emission contribution of the region, the region will monitor the emissions created by the operation of its own facilities and actively strive to reduce them. Adaptation measures will always consider the contribution to the quality of life of residents and visitors to the region		
Regulation/Regulation/another document	regional	Territorial analytical documents of the	The aim of this document is to collect, evaluate and analyse the available information about the	2	

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
		Liberec Region (2021)	territory, relevant for the regional spatial planning activity, which consists in the acquisition and updating of territorial development principles. The documentation can also result in suggestions for the territorial planning activities of the state in the form of problems to be solved. in the territorial development policy or, conversely, initiatives for the level of municipalities defined as problems to be solved in territorial plans. In general, it can be stated that the state and development of the territory, the limits of the use of the territory, the values of the territory, plans to implement changes in the territory and problems to be solved in the spatial planning documentation, identified in the regional ÚAP, are intended to be specified in the municipal documentation.		
regulation	regional	Principles of Territorial Development of the Liberec Region, Update No. 1 (2021)	Regional spatial planning priorities of the region are developed to achieve a balanced relationship of territorial conditions for a favourable environment, for economic development and for cohesion. community of inhabitants of the territory (sustainable development of the territory). The regional	2	

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			spatial planning priorities developing a basic strategy for streamlining spatial planning activities in the territory of the Liberec Region and a framework formulation for defining goals and tasks for spatial planning in the follow-up spatial planning activities of municipalities in the sense of increasing their benefits and minimizing their negative impacts.		
Strategy	National	Strategic Framework Czech Republic 2030 (2017)	The Czech Republic 2030 is a strategic framework that sets the direction in which the development of the Czech Republic and society should be directed by 2030. Its implementation should improve the quality of life in the Czech Republic and steer our country towards development that is socially, economically, and environmentally sustainable. The document creates a basic framework for other strategic documents at a national, regional, and local level.	2	Relevant activities based on the framework: - Promoting sustainable mobility ; - Support of health protection about increased urban temperatures (prevention of heat islands), and better urban planning in relation to vulnerable groups. ...
Strategy	National	National Energy and Climate Plan (NECP) (2023)	This document is an integrated planning document in the field of energy and climate, by the regulation of the European Parliament and the Council on the administration of the Energy Union and climate action. The document sets out the goals and main policies in all five dimensions of the	3	By 2030, it is foreseen with investments and support measures: - develop in particular the production of electricity from renewable sources. And to support it by speeding up permitting procedures ; - development of nuclear power including the possibility of small nuclear reactors ;

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			Energy Union. Through this document, the member states have, among other things, the obligation to inform the European Commission about the national contribution to the fulfilment of targets in the field of greenhouse gas emissions, renewable energy sources, energy efficiency and interconnection of the electricity system. The national plan of the Czech Republic in the field of energy and climate is drawn up for the period 2021-2030 with a view to 2050.		- Support modernisation of technology and higher energy efficiency, energy storage and flexibility ; - Modernisation of industry and the heating sector ; - Reducing emissions in transport (use of hydrogen); ...
Strategy	national	Climate Protection Policy of the Czech Republic (2023)	The Climate Protection Policy of the Czech Republic and the indicative and long-term targets up to 2050 (currently being updated) in the field of GHG emission reduction and thus represents a long-term strategy for low-carbon development of the Czech Republic. The purpose of the Policy is to propose effective and efficient measures in the sectors of energy, industry, transport, agriculture and forestry, waste management, science and research and voluntary instruments, including their contribution to the reduction of GHG emissions up to 2050, including trajectories.	3	The Czech Republic aims to reduce greenhouse gas emissions by at least 55% by 2030 compared to 1990 (in line with the EU target), i.e. to around 87 Mt CO2eq. - installation of photovoltaic and wind power plants, installation of RES capacities ; - Modernisation of technology and higher energy efficiency - in-depth renovation and decarbonisation (heating, cooling) of buildings ; - Modernisation of industry and the heating sector ; - Development/modernization of rail transport ; - Decarbonisation of road transport ; - Hydrogen production and use ; - Amendments to the EU ETS Act ; - Implementation of DNSH and Climate proofing ; - methane reduction - Financing sectoral decarbonisation ;

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
					- Adjustments to public procurement - implications for consideration of climate impacts
Strategy	national	State Energy Policy of the Czech Republic (2023)	The State Energy Policy of the Czech Republic is a strategic document setting up the objectives and priorities of the state in the field of energy management in accordance with the needs of economic and social development and with regard to environmental sustainability.	3	- awareness-raising and educational activities in the field of energy for the public, schools ; - promotion of technical education; - adjusting policy work in relation to energy priorities (spatial development policy, radioactive fallout repository etc.) ; - Investing in nuclear energy; - operation of the Electricity Data Centre; - promotion of energy security ; - carrying out analytical activities (building stock, smart metering, use of CO2 storage); - tackling energy poverty; - updating national strategies and action; plans in relation to energy and climate protection priorities and targets.
Strategy	national	Regional Development Strategy of the Czech Republic 2021+	The ambition of the Regional Development Strategy of the Czech Republic 2021+ is to set the main goals of regional development within a 7-year horizon, or to define, in accordance with Act No. 248/2000 Coll., on the support of regional development (hereinafter referred to as the "Act on the Support of Regional Development"), the main goals of the state's regional policy in the period 2021–2027.	1	-promoting sustainable development; - promoting sustainable forms of mobility ; - promoting cooperation between territorial actors.
Strategy	national	Smart Cities strategy - resilience through SMART solutions	The strategy is focused on the use of innovations in the territory for the benefit of municipalities, cities, and regions, and especially the people	2	- support for research and development to create innovative solutions at the level of cities, municipalities, and regions ; - support for green and innovative solutions ;

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
		for municipalities, cities, and regions (2021)	who live in them. Using the potential of people and the potential of the territory, through new, smart technological tools, regional clusters, or regional cooperation and innovative solutions in municipalities, cities and regions can achieve quality conditions for citizens' lives, a good environment and strengthen the competitiveness of the Czech Republic in international competition.		- support for adaptation measures in cities ; - support for energy solutions and security of emergency infrastructure.
Strategy	national	State environmental policy for 2030 with a view to 2050	The state environmental policy of the Czech Republic for 2030, with a view to 2050 represents. an overarching strategic document that defines the implementation of effective environmental protection in the Czech Republic until 2030. The main goal is to ensure a healthy and high-quality environment for citizens living in the Czech Republic, to contribute to the effective use of all resources and to minimize the negative effects of human activity on the environment, including impacts that go beyond national borders, and thus contribute to improving the quality of life in Europe and worldwide.	3	- defining cross-cutting measures such as improving energy efficiency (reducing the energy performance of buildings, achieving energy savings for heating, promoting high efficiency cogeneration of heat and electricity or efficient heat energy supply systems.
Strategy	national	Biodiversity Strategy of the	The Biodiversity Strategy of the Czech Republic for the period 2016-2025 is a basic conceptual	1	- elimination of non-native species - conservation of natural resources - sustainable use of genetic resources

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
		Czech Republic 2016-2025	document defining priorities in the area of conservation and sustainable use of biodiversity in the Czech Republic. A favourable state of biodiversity is a basic prerequisite for ecosystems to provide basic goods and services to human society. It is therefore necessary to understand the conservation and sustainable use of biodiversity as one of the key pillars of sustainable development in the Czech Republic.		- promotion of biodiversity and research
Strategy	national	National emission reduction program Czech Republic	The National Emission Reduction Programme is one of the basic strategic documents in the field of improving air quality and reducing emissions from sources of air pollution.	3	- Create conditions at the national level to achieve and maintain the applicable immission limits set out in Annex 1 of the Air Protection Act. - Create the conditions at national level to achieve and maintain a 28 % reduction in the area of ecosystems with supercritical nitrogen deposition in terms of eutrophication by 2030 compared to 2005. - Create conditions at national level to achieve and maintain a 77% reduction in the area of forests with supercritical acid deposition by 2030 compared to 2005. - Create conditions at the national level to achieve the ozone pollution guideline targets for the protection of human health and for the protection of crops and vegetation.
Strategy	national	Circular Czech Republic 2040 Strategic Framework (2021)	The Circular Czech Republic 2040 strategic framework is a long-term overarching strategic document for strengthening the principles of the circular economy in the Czech Republic and emphasises the	2	-Waste management must focus on waste prevention and increasing recycling (bio-waste, textile waste, construction waste, food waste, packaging, and e-waste) ; promoting the development of recycling capacity and innovation

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			circular economy as a priority for the Czech Republic. The aim of the framework is to set the future direction of the development of the circular economy in the Czech Republic until 2040.		-development of the bioeconomy ; -prevent landfilling ; -support education, research, innovation, digitisation in relation to the transition to a circular economy ; - improve water management.
Strategy	national	Long-term building renovation strategy Czech Republic (2020)	The strategy includes an assessment of the building stock in the Czech Republic in the residential and non-residential sectors, a methodology for determining energy savings for modelling building renovation scenarios, scenarios for the possible development of building stock renovation with indicative milestones for 2030, 2040 and 2050, the choice of a building renovation development scenario to be implemented by the Czech Republic in the following period, an assessment of barriers in the residential, private and public sectors and the Czech Republic's strategy to support the implementation of the optimal scenario.	3	- energy management support ; - support for energy consultation and Information centres ; - setting up financial support ;
Action plan	national	National Climate Change Adaptation Action Plan (2021)	The National Action Plan for Adaptation to Climate Change is an implementation document of the Climate Change Adaptation Strategy in the conditions of the Czech Republic. The first update of the action plan for the period 2021-2025 was approved by	3	- Support of adaptation of cities and human settlements to climate change (greenery, removal of urban heat islands, promotion of air-conditioned transport)

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			Government Resolution No. 785 of September 13, 2021, the previous version was approved in January 2017 and was intended for the period 2017-2020. The action plan is aimed at solving all significant manifestations of climate change in the Czech Republic - long-term drought, floods, and flash floods, heavy rainfall, rising temperatures, extremely hot temperatures, extreme wind, vegetation fires).		
Strategy	national	Hydrogen Strategy of the Czech Republic (2021)	The Czech Republic's Hydrogen Strategy was developed in the context of the Hydrogen Strategy for a climate-neutral Europe, which reflects the European Green Deal objective of climate neutrality. by 2050. The objective of the Strategy is thus to reduce greenhouse gas emissions in such a way that. the economy shifts smoothly to low-carbon technologies. This is associated with two strategic goals: • Reduce greenhouse gas emissions • Stimulate the economic growth	2	- Support hydrogen infrastructure
Strategy	national	National research and innovation strategy for intelligent specialization of	The National Research and Innovation Strategy for Intelligent Specialization of the Czech Republic 2021-2027 (National RIS3 Strategy) ensures effective	2	- support for innovation and research

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
		the Czech Republic 2021-2027 (National RIS3 strategy)	targeting of funds primarily from European, national, and territorial budgets to support oriented and applied research and innovation. Support is directed to selected priority areas that have a high potential for creating a long-term competitive advantage in the Czech Republic based on the use of knowledge and innovation. The identification and development of these prospective areas, i.e. "intelligent specialization", builds on the strengths of the Czech Republic and individual regions. It strives for targeted "smart" use of the opportunities offered by our economic background and research and innovation capacities. At the same time, the weaknesses of the innovation system are addressed, which represent barriers to the development of the innovation environment as a whole.		
Strategy/Policy	national	Spatial Development Policy of the Czech Republic (7. update, 2024)	-The Spatial Development Policy of the Czech Republic establishes framework tasks for the follow-up spatial planning activities and for specifying conditions for anticipated development plans to increase their benefits and minimize their negative impacts. settle priorities of national spatial	2	- Create territorial conditions for the development of decentralized, efficient, and safe production of energy from renewable sources which is environmentally friendly, to minimize their negative impacts and risks while respecting the priority of providing a safe energy supply to the territory. - Pay particular attention to the connectivity of different modes of transport. Create territorial

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			planning for ensuring sustainable spatial development (e.g. planning, transport, building sector, technical infrastructure - RES development, etc.)		conditions for prioritizing public transport, cycling, and walking. With this in mind, delimit the areas and corridors necessary for efficient integrated public transport systems or urban public transport, enabling the effective interconnection of residential and recreation areas, civic amenities, public spaces, production and other areas, with the requirements for a quality environment and thus creating conditions for the development of an efficient and accessible system that will provide the residents with equal opportunities for mobility and accessibility within the territory. Concerning it, create conditions for the construction and use of a suitable network of walking and cycling paths, including accompanying green spaces where appropriate.
Strategy	national	Transport policy of the Czech Republic 2021-2027 with a view to 2050	The Transport Policy is the top strategic document of the Government of the Czech Republic for the transport sector. Transport policy declares what the state and its executive in the field of transport must do (international links, treaties), wants to do (safety, sustainable development, economy, environment, public health), and can do (financial and spatial aspects).	1	
Strategy	national	Public Transport Concept 2020-2025 with a view to 2030	The concept of public transport is part of the system of planning transport services by public transport in the Czech Republic. This transport service planning aims to create conditions for the	1	- supporting the provision of accessible and efficient public transport in all regions

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			economical, effective, and efficient provision of transport services and mutual cooperation of the state, regions, and municipalities in this activity.		
Strategy	national	Urban and Active Mobility Concept 2021-2030	The Urban and Active Mobility Concept 2021-2030 is a follow-up document to the Transport Policy of the Czech Republic for the period 2021 – 2027 with a view to 2050, while it is aimed at transferring some principles (of the Transport Policy to regional and municipal level. Two parts can be distinguished in the concept of urban and active mobility (e. g. walking and cycling)	2	-support cycling (include infrastructure) -support micromobility, pathways and walking infrastructure and activities
Action Plan	national	National Clean Mobility Action Plan (2020)	The National Clean Mobility Action Plan addresses support for the purchase of vehicles and related infrastructure, the provision of an electricity network, parking vehicles in underground garages, meeting the requirement to achieve a 14% share of renewable energy sources in transport, support for education, research and development in this area and other measures that will help increase the number of alternative fuel vehicles in the Czech Republic, reduce emissions from transport and also support the Czech automotive industry and	3	- purchase of low- and zero-emission vehicles - support for charging infrastructure - Development of non-motorised, multimodal, and active forms of transport and mobility

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			energy in meeting European directives.		
Regulation	national	Law No. 406/2000 Coll., on Energy Management	This Act incorporates the relevant European Union regulations1) (hereinafter referred to as "the Union") and, following directly applicable Union law governing labelling requirements22), provides: certain measures to increase the cost-effectiveness of energy use and the obligations of natural and legal persons in energy management; rules for the creation of the State Energy Concept, the Territorial Energy Concept and the State Energy Savings Programme; eco-design requirements for energy-related products; requirements for the labelling of energy-related products to indicate the consumption of energy and other essential resources; information and education requirements for energy savings and the use of renewable and secondary sources; certain rules for the provision of energy services.	3	- implementation of the law at lower levels - responsible use of programs in obl. energy savings etc.
Regulation	national	Act No. 383/2012 Act on greenhouse gas emission allowance trading conditions	Emissions trading is a tool to incentivize the reduction of greenhouse gas emissions in the most efficient way. Entities that have the ability to reduce emissions at lower cost can sell the saved emission allowances or	3	- from 2027 there will be an increase in the carbon price for the fuel and transport sectors, and relation to this law there must be support for zero and low emission transport and the heating sector to avoid increased costs

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
		(currently being amended)	other emission credits to those for whom such reductions would be more costly. Trading between the Annex 1 countries of the Kyoto Protocol is possible under the flexible International Emission Trading mechanism; the largest emissions trading scheme is the European Union Emission Trading Scheme (EU ETS), in which the Czech Republic participates as an EU Member State. It is expected to be extended to the buildings, transport, and other sectors from 2027.		- measures should be in place to protect vulnerable groups against increased fuel and energy prices
Regulation	national	Act No. 165/2012 Coll. Act on Supported Energy Sources and on Amendments to Certain Acts	The aim of the Act is to establish a basic framework for the use of renewable sources, the combined production of electricity and heat and decentralised production is established in the Czech Republic (from the amendment of the law it should be abolished, author's note). The purpose of the Act is to further implement the related European Union regulations, establish the basic framework of the National Renewable Energy Action Plan and the financing of the costs incurred for the promotion of renewable energy sources.	2	- the law clearly specifies which electricity is supported (biogas plants and combined production of electricity and heat, etc.)
Regulation	national	Act No. 541/2020 Coll. Waste Act	The basic rules for waste management are laid down in Act No. 541/2020 Coll., on waste and its implementing legislation. It also	1	- making waste management more efficient, control and in compliance with laws, elimination of landfilling

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			imposes an obligation on municipalities, which must take over all municipal waste generated on their territory by the activities of non-business individuals and must designate sites for the separate collection of municipal waste.		
Regulation	National	Law No. 85/2012 Coll., on the storage of carbon dioxide in natural rock structures and the amendment of some laws	This act incorporates the relevant European Union regulation1) and regulates the rights and obligations of legal and business individuals in the field of carbon dioxide storage in natural rock structures and the exercise of state administration related thereto.	3	- the possibility of operating a carbon dioxide storage site
Regulation	National	Law No. 73/2012 Coll., on substances that deplete the ozone layer, and fluorinated greenhouse gases	This Act builds on directly applicable European Union regulations1),2) and governs the rights and obligations of persons and powers of administrations in protecting the Earth's ozone layer and the Earth's climate system from adverse effects of controlled substances according to Art. Article 3(3) 4 Regulation (EC) No 1/2004 of the European Parliament and of the Council 1005/2009 on substances that deplete the ozone layer, as amended (the controlled substance), and fluorinated greenhouse gases, as referred to in Art. Article 2(2) 1 Regulation (EU) No 1/2004 of the European Parliament and of the Council 517/2014 of 16 April 2014 on	3	- protecting the Earth's ozone layer and the Earth's climate system

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			fluorinated greenhouse gases and repealing Regulation (EC) 842/2006 (hereinafter referred to as fluorinated greenhouse gas).		
Regulation	EU	Regulation 2024/573 of the European Parliament and of the Council of 7 February 2024 on fluorinated greenhouse gases	Regulation (EU) 2024/573 - adopted by the co-legislators on 7 February 2024 - focusing on fluorinated greenhouse gases (F-gas). It introduces amendments to Directive (EU) 2019/1937 and repeals Regulation (EU) No 517/2014, also known as the *F-Gas Regulation*. This is a text with EEA relevance. This Regulation lays down revised rules on containment, use, recovery, recycling, reclamation, and destruction of fluorinated greenhouse gases and on related ancillary measures, such as certification and training, which includes the safe handling of fluorinated greenhouse gases and of alternative substances that are not fluorinated. It also imposes conditions on the production, import, export, placing on the market, subsequent supply, and use of fluorinated greenhouse gases, and of specific products and equipment containing fluorinated greenhouse gases or whose functioning relies upon those gases. It imposes conditions on specific uses of the gases,	3	We are not enclosing any EU regulation and strategies because those are very well-known and valid for all EU cities. Nevertheless, since bellow, we are referring this regulation and its impact, we are listing this regulation in this CCC AP part as well. In Liberec, there are several manufacturers of refrigeration equipment, and this regulation will influence this field a lot, our external consultant estimated its impact, which is included in the table referring the emission gap. This will be developed yet – we will build on this commitment with facilitation of further cooperation with industry and business sector in the city.

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
			establishes quantitative limits for the placing on the market of HFCs and establishes rules on reporting.		

A-2.1: Description & assessment of policies

The above-mentioned tables show that policies, strategies and other related documents cover all important parts of this mission. There are many plans, sectoral documents and regulations at all levels following the EU principles and the overall focus. When developing strategic documents at the local level, quality of such documents has increased significantly over time, also the level of public participation in terms of professional public and broad public (citizens). Superior (regional and national) documents are followed as well. Problematic is their implementation because there is a lack of capacity in terms of funding and expertise, mainly at the municipal level.

Municipal strategic documents:

All strategic documents are updated regularly and implemented via action plans. What is important for this mission is that all key strategic documents were updated quite recently:

- Master plan for the city (2022)
- Sustainable Urban Mobility Plan (2022)
- Adaptation Strategy (2023)
- Integrated Territorial Investment Strategy for the Agglomeration of Liberec and Jablonec nad Nisou (2023)
- Sustainable energy and climate action plan update (2022)

All those documents represent a basis for this Climate Action Plan.
In case of master plan, mitigation and adaptation activities are supported by these specific goals and measures:

Specific goal: Urbanism and public space
3.2.2. Increase in the city accessibility

Specific goal Transportation and transport infrastructure
3.3.1 Accessible, comfortable, and sustainable public transport
3.3.3 Support for cycle transport, cycle tourism and pedestrian transport
3.3.10 Support for electromobility and other alternative fuels
3.3.11 Education in the field of sustainable urban mobility

Specific goal Technical infrastructure
3.4.2 Effective development and management of public lighting, including light signalling equipment
3.4.3 Support for reconstruction, optimization and ensuring the efficiency of central heat supply system, construction in separate locations
3.4.4 Insulation of municipal buildings, support for energy-saving solutions, energy management development
3.4.7 Support for the development of renewable energy sources within the local energy sector (where there are supported activities such as municipal energy system re-design including management of energy consumption and its regulation, community energy projects based on renewable resources, maximum use of renewable energy sources in the city's public buildings, in municipal buildings institutions, city organizations and other subjects)

Specific goal the Environment
3.5.1 Strategic approach to environmental issues
3.5.10 Support for alternative energy sources, including decentralized energy production
3.5.13 The climate-responsible city (where there is included action plans implementation: climate, energy, blue-green infrastructure, sustainable mobility; new job positions, strategic decision making for the climate, creation of circular urban economy, ecological running of the city)

Specific goal High-quality public administration/government
3.6.2 Innovation implementation and optimization of processes, implementation of smart solutions and principles of smart city

Legislation, regulation, and barriers at the national level:

Overall legislation in the field of climate transition is shaped on international agreements and conventions and the EU legislation as the Paris Agreement and the Green Deal for Europe, the Fit for 55 policy package. The most important above mentioned strategic documents for the national level are the National Energy and Climate Plan and National Climate Change Adaptation Action Plan. Like the EU, the Czech Republic is committed to achieve climate neutrality by 2050 and as a part of the Climate Policy, has been set the goal of reducing the GHG emissions by 44 Mt by 2030 compared to 2005. In 2019, compared to 1990, GHG emissions were reduced by approx. one-third due to the abandonment of heavy industry in the 1990s.

In the field of energy, Czech Republic needs to approve its national **Czech Climate Law** following The European Climate Law regarding the target of reducing net GHG emissions by at least 65 % by 2030 compared to 1990 levels. Czech Republic is committed to complying with the Paris Agreement; to be able to do so, we need to set up appropriate mechanism since decarbonisation is slow and inefficient now.

New climate law is under preparation now and should create clear and understandable conditions for counsellors and mayors, under which they will receive state support and will be able to co-design and co-decide on part of the investments. Decision making on climate investments will be brought closer to citizens. Other benefit is legal enforcement where courts can order authorities to act in accordance with the law and this is what new climate law will allow – since big problem in Czechia is that there are many strategic document but no one enforces them. It means Czech current obligations are not enforceable, this reduces legal certainty. In addition, we do not have a mechanism to invest about one trillion crowns meaningfully (allocation to reduce emissions. The law brings transparency to the fulfilment of climate goals, it will be clear to everyone who makes relevant decision about what and why, on what basis and what facts to take into account.
The law will indirectly support the development of renewable energy sources, but in itself does not change the necessity of assessing the impact of each project on the landscape and other components of the environment according to local conditions. This is regulated by other laws. Furthermore, this law will motivate the use of land in a way that ensures greater capture of carbon from the atmosphere, especially in forestry and agriculture. However, it will be necessary to revise the way the sequestration calculation has been done so far to incentivize, for example, sequestering carbon in the soil of old unharvested forests instead of growing wood for thermal power plants, which releases all the sequestered carbon back into the atmosphere.

In addition to the climate law, there would be useful to set up **a climate council**, an expert advisory body consisting of independent experts and professionals in science, energy, transport, society, and nature protection. Such council would help the government to develop the long-term goals and monitor emissions reduction. There is an ordinary understanding that major barrier for further development not only of RES is the absence of effective climate legislation that would ensure the fulfilment of European goals. The Climate Council would be able to monitor the fulfilment of the promised obligations, publish knowledge and scenarios in the area of reducing emissions and communicate everything with the public and the media. Such body would bring scientific patronage, now only for the government to review and assess plans, but also externally. Such council would be a kind of a mediator, a body that stands between all affected areas, it should provide advice as well as review decisions.

Governance structure for the implementation of national energy and climate policies

The EU's climate and energy targets for reducing emissions, increasing the share of renewable energy sources, and increasing energy efficiency are also being written into Czech climate and energy

policies. The Czech targets are contained in the National Energy and Climate Plan, the State Energy Concept, and the Climate Protection Policy. These policies are now being updated and their objectives and direction must be implemented at all levels of government and the private sector. To effectively implement national energy and climate policies, there are several important bodies responsible for various activities related to adaptation and mitigation measures, strategic understanding, and investment support for transport, energy, climate protection, and the environment. These bodies include:

Ministry of Environment: This ministry is responsible for the preparation of the National Climate and Energy Plan and the Climate Protection Policy. It is also responsible for environmental protection, sustainable development, trading of emission allowances, adaptation and mitigation measures, measures related to energy efficiency, insulation of buildings, exchange of heat sources, RES, and low-emission transport.

Ministry of Industry and Trade: This ministry is responsible for the preparation of the State Energy Concept and energy law, also provides advisory services and support for the energy sector, and renewable energy sources (such as wind energy), work towards reducing dependence on fossil fuels and supports businesses.

Ministry of Agriculture: The policy of this ministry is focused on sustainable agriculture and forestry, which can have an impact on greenhouse gas emissions and the preservation of land as a carbon reservoir.

Ministry of Transport: This ministry's primary focus is to reduce emissions from transport and promote sustainable modes of transport such as development of the public transport.

Decarbonization of building sector

The **buildings sector** is crucial to reducing emissions. Cities like Liberec must take responsibility and set an example as model investors and property managers by ensuring that their buildings are ecologically friendly. Systematic support for quality planning is a vital part of the decarbonization process, along with the preparation of sustainable public procurement practices. This includes promoting the use of natural, recycled, and other materials with a low carbon footprint. These efforts are influenced by Law No. 134/2016 Coll. on public procurement, which governs and impacts local procurement practices. At the legislative level, it is crucial to establish a predictable legal environment. This requires the timely and high-quality implementation of relevant directives, clear interpretation of EU Taxonomy rules, and adjustment of funding regulations for projects focused on energy efficiency and material conservation. To support these efforts, a sustainable materials database is currently being developed to help navigate the environmental impacts of materials used in the construction industry, including their energy efficiency.

On March 12, 2024, the European Parliament approved the revision of the Energy Performance of Buildings Directive (EPBD), which is one of the flagship legislative acts for reducing energy needs in buildings. The Czech Republic now has two years to implement this directive, which will primarily involve amendments to Act 406/2000 Coll. on Energy Management and Decree 264/2020 Sb. on Energy Performance of Buildings. Currently, there is no comprehensive energy certification for all buildings, making it challenging to identify which buildings require renovation. As a result, the pace of renovations and the implementation of climate commitments will need to intensify, presenting significant challenges, particularly for lower levels of government.

The decarbonization of the building sector may be affected by:

- High investment costs associated with the renovation of buildings ;
- Legislative barriers - obtaining a permit or announcing a building, fire safety regulations ;
- Unclear conditions for funding for low-carbon construction projects in relation to the EU Taxonomy ;
- Shortage of skilled labour and companies ;
- Poor material availability ;
- Preservation of buildings and heritage zones ;

- Energy price volatility (less motivation to carry out renovations) ;
- Insufficient advice service/network on energy saving, renovation, and decarbonisation of buildings ;
- Insufficient flexible financial support for the development of the sector ;
- Emissions targets for buildings are not being met (unsatisfactory building quality, risks associated with lack of interest from building owners etc.) ;
- Lack of availability and scalability of tools for environmental assessment of buildings ;
- The unavailability of data on the housing stock, as well as the lack of official data on emission intensities of sources (For decarbonisation planning and design of new buildings and for planning energy-saving measures in existing buildings, in addition to the available methodology, there is a need for up-to-date official information on the emission intensities of individual energy sources and guidance on how to calculate emission factors for future years).

Decarbonization transport sector

The transport sector is responsible for approximately 16% of emissions in the Czech Republic. Unlike other sectors, transport emissions are on the rise, contributing to local pollution. The country is facing an increasing dependence on car travel, exacerbated by its dispersed settlement pattern, consisting of 6,254 municipalities, half of which have fewer than four hundred inhabitants. This diversity in settlement patterns puts pressure on transportation infrastructure, the availability of public transit, and increases reliance on car travel. The lack of compactness and the distance between cities further strain municipal and regional budgets, which must ensure the integration of transportation systems, particularly in providing regular services such as buses or trains. The primary methods for reducing carbon emissions in the transportation sector include promoting a modal shift, reducing the need for travel, and electrifying transportation. The legal framework influencing the development of transport infrastructure includes Act No. 361/2000 Coll. (the Road Traffic Act), Act No. 13/1997 Coll. (the Roads Act), Act No. 56/2001 Coll. (the Act on Conditions of Vehicle Operation on Roads), and Act No. 416/2009 Coll. (the Line Act, which focuses on accelerating the construction of infrastructure). Additionally, Decree No. 501/2006 Coll. sets general requirements for land use, including standards for parking areas, as outlined by the Czech technical standard for the design of local roads (ČSN 73 6110 - Design of Local Roads), which applies throughout the Czech Republic, except in Prague. The main strategic document guiding transport policy in the country is the "Transport Policy for 2021-2027," developed by the Ministry of Transport, with a focus extending to 2050. This document is crucial in shaping the future of transportation infrastructure and policy in the Czech Republic.

The concept of sustainable mobility plays a crucial role in transportation planning, grounded in the principles of sustainable development. It encompasses a range of mobility options, including walking and active mobility, public transport, bike-sharing, scooter-sharing, carsharing, and carpooling. At the national level, this concept is further developed in the "Concept for Urban and Active Mobility 2021-2030." Implementing this concept requires a place-based approach that takes into account specific territorial characteristics in local planning efforts, such as Sustainable Urban Mobility Plans (SUMP), cyclo-generals, and plans for barrier-free routes. Biofuels, as a renewable alternative to fossil fuels, can also play a significant role in the transport sector. Selected parts of the "Fit for 55" package directly or indirectly influence the production and use of biofuels, including the revision of the Renewable Energy Directive (RED III). At the national level, the management of biofuels is governed by Government Regulation No. 107/2022 Coll., which outlines sustainability criteria for biofuels and mandates the reduction of greenhouse gas emissions from fuels, as well as by Act No. 201/2012 Coll. on Air Protection.

The decarbonization of the transport sector may be affected by:

- More than 6.5 million registered vehicles and heavy reliance on individual car transport (behavioural aspects)
- Very dispersed urban development with a low population per km2
- Operation of inefficient transport links at a lower level (region/municipality), which carries a heavy financial burden;
- Shortage of public transport drivers (long-term high employment rate int the Czechia, in remote areas)
- Slow implementation of innovation and digitalisation in the transport sector
- Insufficient professional capacity in the sector
- Complicated and slow legislative permitting of infrastructure constructions, including land purchase (heavily urbanized area, complications in building permitting);
- Increasing costs of fleet operation (in the future in relation to the implementation of ETS2)
- The absence of a charging infrastructure as one of the key barriers to the development of electromobility ;
- The slow development of alternative fuels and the use of hydrogen in transport;
- slow onset of electrification of transport;
- The legal environment surrounding public procurement and concessions can pose challenges for transportation development in smaller municipalities ;
- Insufficient flexible financial support for the development of the sector

The renewable energy sources development and the development of community and shared energy

Currently, renewable energy accounts for about 17% of the Czech Republic's total energy consumption, with 6% coming from photovoltaic (PV) and wind power plants (WPP). The vast majority of this renewable energy is derived from various forms of biomass. However, the Czech Republic is lagging in the construction of renewable energy sources (RES), and it is essential to accelerate this development. The energy crisis that began in 2021 has heightened the urgency to implement measures that enable effective decarbonization. In response, the country's energy legislation is being progressively amended. The first amendment, known as Lex RES 1, was passed to simplify the construction of renewable energy sources. At the end of 2023, Lex RES 2 was enacted, establishing rules for community energy and electricity sharing. The forthcoming Lex RES 3 will set out the regulations for energy storage and the aggregation of flexibility. These legislative changes will make it easier for households, local governments, and other entities to build renewable energy sources. They will also facilitate the establishment of energy communities and the sharing of electricity among participants, thereby promoting a more decentralized and sustainable energy system in the Czech Republic.

For the Czech Republic, the National Climate and Energy Plan, the State Energy Strategy and the Climate Protection Policy in the Czech Republic are essential documents. It delivers a plan that will lead to a major reduction in greenhouse gases and long-term climate neutrality by 2050. All these documents are currently being updated. These strategies will significantly influence strategic planning at the local level and the construction of renewable energy sources.
The construction of renewable energy sources may be affected by:

- The opportunities involved in the planning and construction of the RES in Liberec and its surrounding areas may be affected by the upcoming so-called acceleration zones. The demarcation of suitable areas for RES in individual land-use planning instruments (updates of the Czech Republic's Land-Use Development Policy) will significantly (accelerate and simplify) the permitting process. It will be a renewable energy facility, such as solar parks or wind farms.
- An amendment to Act No. 334/1992 Coll., on the Protection of the Agricultural Soil Fund is currently in the legislative approval process, which should also allow for the development of agrivoltaics.

- The planning and permitting process for building renewables is very bureaucratically limiting and lengthy. This discourages developers and causes the failure to meet the targets of the RES construction.
- The construction of renewable energy sources, such as wind farms, is not always well-received by the public. People may not want them built near their homes due to concerns about noise, impact on animals, and protection of the landscape. This is commonly referred to as the NIMBY effect. This problem goes together with an **absence of public education** at the national level, it is crucial to explain properly the current energy situation and the role of the RES construction. Citizens often speak out against the construction within the framework of landscape character preservation. It is necessary to emphasize the public interest in the construction that would maintain the current living standard.
- It will be necessary to strengthen the grid for the wider development of RES, as well as the promotion of community and municipal energy. An energy data centre is planned to operate by 2026, which will make many of these activities more efficient and flexible.
- In the case of the permitting process, as a part of the construction permitting procedure, the new Building Act and its amendment led to certain simplifications and digitization of the entire procedure, however, some barriers remain, for example, public access to proceedings, the possibility of appeal, etc. **Long deadlines for decisions** are even in conflict with the EU Council Regulation Nr. 2022/2577. In this context, it is necessary to draw attention to the act that the Czech Republic has not yet transposed the Directive Nr. 2019/944 On common rules for the internal electricity market, which includes the **establishment of a so-called single point of contact** among the requirements for simplifying the authorization processes. It is supposed to be an entity to which the applicant for the issuance of a permit for the generation of electricity from RES will submit one application and will not be forced to get other statements and approvals for the state administration body. The opportunity is the newly established **Transport and Energy Building Office** which was established on the basis of the amendment to the Building Act in 2023, this body should ensure the uniformity of the approach to permitting constructions and also sufficient expertise of the officials.
- The adoption of so-called **acceleration zones** for the development of renewable energy sources (wind and solar), which are currently under drafting, will help to speed up and simplify the process of RES development. Depending on the importance of each zone, the state, regions, and municipalities will be in charge of defining the acceleration zones (this will not apply to NATURA 2000 areas, national parks, and some protected landscape areas).

Decarbonisation of the industrial sector

The Czech Republic is a highly industrialised country. In 2021, the Czech industry produced thirty-one megatons of CO2eq, which represents about 24% of the total greenhouse gas emissions in the Czech Republic. The production of emissions by these companies is limited by the market for emission allowances. The largest GHG emitters are the cement, whitewash, steel and metals, fertilizers and chemicals sectors, and related other manufacturing sectors. The industrial sector accounts for a significant share of the economy's gross value added. It also employs the largest number of people (about 28 % of employment in this sector) and is well above the European average compared to other countries.

Modernisation of production is expected, in particular through gradual electrification, introduction of RES or use of hydrogen technologies. In the field of hydrogen use, the Czech Republic has its Hydrogen Strategy from 2021. Furthermore, it is envisaged to make production more efficient, implement modern technologies contributing to emission reduction and energy savings. Furthermore, the use of CO2 capture technologies and its further use or geological storage (i.e. carbon capture, utilisation, and storage) is envisaged. There are already small-scale projects here in the Czech Republic. The EU has produced the mechanism for a just transition, which is supposed to help Member States with a difficult transition both financially and technically. In the Czech Republic, it is implemented from 2021 as the Just Transition Operational Programme, which brings funding to three coal regions (Moravskoslezský, Ústecký a Karlovarský) to help them with their transition to a low-

carbon economy. The strategy for the three coal regions in the country is then addressed by the RE:START Strategy. The modernisation of industry (not only) for the whole country is then financed mainly from the Modernisation Fund, which is financed from emissions trading.

The decarbonization of the industrial sector may be affected by:

- Insufficient investment in modern technologies
- Insufficient electrification and deployment of renewables
- Higher price of emission allowances
- Historical context of industrial development in the Czech Republic
- insufficient resources invested in education, science, and research in the field of modern technologies and development e.g. CCUS
- Insufficient policies for further development of regions and economic transformation where heavy industry is located (so-called structurally affected regions)
- Fear of job loss for many people in structurally affected regions

The waste management sector

According to MOE data, the Czech population generated 39.9 million tonnes of all waste in 2021, including 1.6 million tonnes of hazardous waste and 38.3 million tonnes of other waste. Total emissions are around six million tonnes CO2eq of greenhouse gases, which represents about 5% of the total greenhouse gas emissions in the Czech Republic. The waste management sector is regulated in the Czech Republic by Act No. 541/2020 Coll., Waste, which is in accordance with Directive 2008/98/EC of the European Parliament and of the Council on waste. An important objective is, in particular, to end landfilling of waste by 2030. The overarching document for this area is the Circular Czech Republic 2040 Strategic Framework approved by the Government in 2021, which also prioritizes ending landfilling, promoting recycling, waste prevention, and material reuse of waste, etc., the document also has an implementation plan. There is also a link to Act No. 254/2001 Coll., on Water, and related decrees and regulations, and Act No. 76/2002 Coll., on Integrated Pollution Prevention and Control ensures water protection and purification. Water pollution is a long-standing problem in the Czech Republic. Other important Acts are 477/2001 Coll., on the packaging and 542/2020 Coll., on end-of-life products, 243/2022 Coll., on limiting the environmental impact of selected plastic products. From 2025, municipalities must sort at least 60%, from 2030 at least 65% and from 2035 at least 70% of mixed municipal waste. Methane reduction in the management of biodegradable municipal waste is also an important aspect.

The waste sector may be affected by:

- Insufficiently interconnected sectors to fulfil the principles of the circular economy, connected with lack of comprehensive education and linkages between different sectors to apply circular principles;
- Insufficient human capacity and innovation environment
- Hygiene regulations (and standards) may also limit recycling and other related sectors related to waste and its careful use (single plastic use etc.);
- Excessive bureaucracy and an unfriendly regulatory environment;
- Insufficient incentives and price signals for companies and other sectors to recycle and reuse waste;
- Continuous growth in the total amount of waste generated and an underdeveloped treatment market;
- Insufficient control and monitoring (e.g. in case of landfill penalties, thorough recycling of building materials, etc.) ;

- Producers are not sufficiently accountable for the production of their products and their future use ;
- Complex backup systems and incentive systems for their use are still lacking;
- Lack of digitalization and monitoring of waste streams;
- Lack of technological innovation (sorting lines, automatization, waste treatment).

Following table shows the city's emissions gap and residual emissions.

	(1) Baseline emissions	(2) Emissions Reduction Target 2030		(3) Emission reduction through other Action Plans		(4) Emissions Gap		(5) Emissions reduction through the CCC Action Plan to address the Gap		(6) Residual emissions	
	Baseline emissions (ideally not older than 2018) - referring to the inventory used for target setting	The emissions reduction target for 2030 ideally achieves a minimum 80% reduction from the baseline, as reported in Section 2 of the Commitments document of the CCC. The overall target should be absolute or net-zero (i.e. including the compensation of any residual emissions).		These are the emissions reductions that would be achieved through existing policies, and plans, outlined in Section A-2.1. Those actions are by definition not part of the action portfolio in section B. If they are fully or partially incorporated in module B-2, their associated reduction potential should be referenced in column (5) and not be included here. WARNING if the baseline is a BAU scenario: If the BAU modelling includes any of these existing measures, please also do not include the associated emissions reduction in this column as otherwise it would be double counted.		(4) = (2) – (3)		This column is used to present the already quantified emission reduction associated with the action portfolios outlined in module B-2. Ideally, this equals the gap. If the there is a difference between the reduction potential of the actions specified in module B-2 (for instance because their reduction potential has not been fully estimated or because additional measures will be identified in future iterations), the CCC AP should be explicit about this difference and explain how the difference will be closed. In principle, as long as the difference has not been addressed, it would be considered as part of the residual emissions.		(6) = (1) – (2)	
	(absolute) (t CO_2eq)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)
Buildings	598,991	550,399	91.88	0	0	550,399	91.88	550,399	91.88	48,592	8.12
Transport	91,048	45,910	50.42	0	0	45,910	50.42	45,910	50.42	45,138	49,58
Waste	0	36	-	0	0	36	-	36		-	-
Industrial Process and Product Use (IPPU)*	34,605	11,074*	32	11,074*	0	0	0	0	0	23,531	68
Agricultural, Forestry and Land Use (AFOLU)	16,069	0	0	0	0	0	0	0	0	16,069	100
Total	740,713	607,419	82	11,074	0	596,345		596,345	82	133,294	18

**Estimated emission cut by external consultant - impact of the Regulation 2024/573 of the European Parliament and of the Council of 7 February 2024 on fluorinated greenhouse gases. Although we plan to cooperate on the overall transition with industry, currently any related activity is not addressed in this Action Plan and will be developed in a more detail yet .*

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

Module A-3 “Systemic Barriers to 2030 Climate Neutrality” documents and describes the stakeholder system, mapping, and the whole ecosystem mapping and identification of systemic barriers and opportunities.

First, specific barriers and opportunities were identified for each sector. This mapping was developed in collaboration with municipal departments, and the consolidated results are listed in the table below. In general, the barriers and opportunities in Liberec are largely similar to those in other Czech cities, as the overall environment—comprising legislation, regulation, subsidies, and public mentality—is primarily shaped at the national level. However, there are also some local specifics unique to Liberec that have been considered.

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
1. Climate change (mitigation/ adaptation areas, meeting the climate goals)	1.1 Lack of funding for adaptation/mitigation measures. In particular, the volatility of the subsidy environment, increasing administrative burden and demands on subsidy providing, and insufficient flexibility of financial support. (Ministry of Finance, Ministry of the Environment, Ministry of Industry and Trade, Ministry of the Regional Development). 1.2 Complexity of implementation at the municipal level. Lack of knowledge of the environment and climate area (municipal level) 1.3 Shortage of experts and capacities, no funding for increasing overall capacities (all levels). 1.4 Unclear subsidy environment (local, regional level) 1.5 Unclear and complex legislative environment – at the national level (local level)	1.7 Potential for financial support and grants (Ministry of the Environment, Ministry of Regional Development - mobility, Ministry of Industry and Trade – climate positive infrastructure (wind power plants, CCUS), Ministry of Labour and Social Affairs – innovation projects). 1.8. Provide methodological support for grant calls related to decarbonization measures. (Ministry of Industry and Trade, Ministry of the Environment) 1.9 Clarify the offset schemes (possible by 2030) and create a legislative framework for emission offsets. (Ministry of the Environment). 1.10 Support CCUS (Carbon Capture, Utilization, and Storage) through pilot projects. (Technology Agency of the Czech Republic). 1.11 Increased environmental awareness (Ministry of the Environment, Ministry of Education, all levels).

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
	1.6 Fear of control systems that hinder the implementation of innovative climate-friendly projects, etc. (local level).	1.12 Setting up the monitoring and evaluation of the city's emission footprint, preparing adequate actions, mobilizing finances for the implementation of climate measures (local level)
2. Building sector and urban planning	2.1 High costs of renovations and innovative technologies (Ministry of Finance, Ministry of the Environment, Ministry of Industry and Trade, Ministry of the Regional Development). 2.2 Shortage of environmentally friendly building materials (Ministry of Industry and Trade, Ministry of the Environment). 2.3 Higher regulation in the case of renovations - very strongly affects heritage sites and protected conservation areas where higher energy standards cannot be achieved (Ministry of Culture, National Heritage Institute, Department of Heritage Conservation of the City) 2.4 The legislative environment and lack of regulatory plans complicate actual construction and urban planning. Currently allows rather non-compact and low-rise developments to be built, other rules make the building very expensive (e.g. number of parking spaces) and thus limit affordable housing, also building as energy-efficient housing (Ministry of the Environment, Ministry of Industry and Trade, Ministry of the Regional Development). 2.5 non-innovative, non-conceptual planning of buildings, without greenery, smart systems (air conditioning, etc.),	2.6 Energy savings and reduced operating costs of buildings (Ministry of Industry and Trade). 2.7 Increased property values and energy class of buildings (Ministry of Regional Development, Ministry of the Environment). 2.8 Coordinate and determine the status of solutions and needs of construction material manufacturers (assess how prepared individual production plants are for decarbonization). (Ministry of Industry and Trade, Association of Building Entrepreneurs of the Czech Republic, Confederation of Industry of the Czech Republic) 2.9 Build compact and multi-story buildings, thus not allowing wider development of the surrounding area (municipalities, individuals, companies). 2.10 Greater emphasis should be placed on constructing green corridors in urban areas to eliminate heat islands. This includes building water features and fountains in public spaces to cool individual urban locations and districts. This effort can be led by municipal authorities, NGOs, and the private sector.

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
	and the use of quality materials (municipalities, individuals, companies).	
3. Transport and mobility sector	3.1 Transport is a very energy-intensive sector, 93% of energy for transport in the Czech Republic comes from fossil fuels, and the Czech Republic has an old vehicle fleet (on average 16 years/car, around 6 million vehicles). Fleet renewal can be difficult. 3.2 High investment costs for infrastructure development (Ministry of Transport). Building new infrastructure for electric vehicles (EVs), public transportation, and cycling paths requires substantial financial investment (other levels). 3.3 Need for extensive planning and regulation (Ministry of Transport). 3.4 Electric and hybrid vehicles are often more expensive upfront compared to conventional gasoline or diesel vehicles. 3.5 Attracting private investors can be challenging due to perceived risks and long return-on-investment periods associated with sustainable transport projects. 3.6 Building low- and zero-emission transport places heavy demands on the necessary raw materials (e.g. battery systems), which are imported from other countries, creating import dependency on other countries.	3.7 Reduced greenhouse gas emissions and air pollution in the sector of mobility/transport: building low-emission rail transport, development of multimodal transport (carsharing etc.), and development of electromobility (Ministry of the Environment, Ministry of Transport, Ministry of the Regional Development, regional transport structures - regions, associations of transport contracting authorities, etc.). 3.8 Extraction of lithium - the material for battery production helps eliminate dependence on its import (National level, ministries) 3.9 Improved public transportation and transport infrastructure (Ministry of Transport). 3.10 Increased use of cycling and walking (Ministry of Transport, Ministry of Health). 3.11 Promote favourable electric vehicle purchase (leasing) schemes for companies/individuals (Ministry of Environment, Ministry of Industry and Trade). 3.12 Improved quality of life in the city (reducing car pollution, car-free zones), and better urban planning – the city of short distances concept (Ministry of Health, Ministry of Regional Development, regions, municipal level, private sector).

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
4. Energy sector	4.1 Dependence on fossil fuels (Ministry of Industry and Trade). 4.2Insufficient investment in renewable energy sources (Ministry of Industry and Trade, Ministry of the Environment). 4.3 Technological barriers and need for grid modernization (Ministry of Industry and Trade, Ministry of Transport, energy companies, regional electricity distributors). 4.4 Strict legislative environment that limits projects. Restrictive legislation in the framework of RES construction permitting (Ministry of Industry and Trade, Ministry of the Environment). 4.5 Energy monopoly (national level). 4.6 General negative public perception (NIMBY) of the construction of wind and solar power plants (lack of education, concern about the preservation of the landscape, lack of communication between the developer - city - residents). (regional and local level).	4.7 Increased energy independence and security (Ministry of Industry and Trade). 4.8 Support for innovation and technological advancement (Ministry of Industry and Trade). 4.9 Reduced energy costs (Ministry of Industry and Trade) and protect people from energy poverty (Ministry of Industry and Trade with the Ministry of Labor and Social Affairs). 4.10 Creation of new jobs in the renewable energy and construction sectors (Ministry of Labor and Social Affairs). 4.11 Adoption of legislation to support renewable zones i.e. acceleration zones, LEX RES III - legislation that will support energy sharing, law on the protection of the land fund that allows the construction of agrivoltaics (Ministry of the Environment, Ministry of Industry and Trade). 4.12 Increased emphasis and information (support) for residents to replace coal-fired boilers with natural gas boilers and purchase heat pumps (Ministry of Environment, municipal level). 4.13 Creation of new jobs in the energy sector/ support education (all levels). 4.14 More women employed in the energy sector (all levels). 4.15 Establishing and involvement in community energy (municipal levels). 4.16 Establishment of a one-stop shop for housing including energy advisory service - especially targeting vulnerable households (municipal levels)

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
5.Waste management and circular economy	5.1 Complex waste sorting and recycling processes (Ministry of the Environment). 5.2 Lack of infrastructure for waste processing (Ministry of the Environment). 5.3 Ineffectiveness of current waste management systems (Ministry of the Environment).	5.4 Reduced amount of waste going to landfills (Ministry of the Environment). 5.5 Reuse of materials and resources (Ministry of Industry and Trade), also support re-use centres in the city (municipal level). 5.6 Increased sustainability awareness among residents (Ministry of the Environment, Ministry of Education with other Ministries, regional and local levels – municipalities, companies) 5.7 Gradually adjust standards to allow the safe use of products with recycled content. (Ministry of Industry and Trade, Czech Office for Standards, Metrology and Testing, in cooperation with the Ministry of the Environment 5.8 Preparation of a standard for stormwater management within the city (a binding document for existing buildings and future development projects (municipal level). 5.9 Support the upgrading of waste sorting lines and the control of problematic waste. Support the upgrading of waste sorting lines and the control of problematic waste (municipal level)
6. Industry and business	6.1 Resistance to investing in ecological measures (Ministry of Industry and Trade, companies, municipalities, individuals). 6.2 Transition to low-carbon technologies can be costly (Ministry of Industry and Trade, Ministry of Regional	6.4 Reduced operational costs due to energy efficiency (Ministry of Industry and Trade). 6.5 Mobilization of international investment in Czech companies for decarbonization (Ministry of Industry and Trade, Czech Invest).

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
	Development, Ministry of the Environment, each region, companies). 6.3 Regulatory and administrative barriers (Ministry of Industry and Trade, Ministry of the Interior).	6.6 Potential for obtaining certificates and grants (Ministry of Industry and Trade, Ministry of Regional Development). 6.7 Increased market competitiveness through innovation (Ministry of Industry and Trade). 6.8 Methodological assistance to support the implementation of ESG and its deployment within all companies and other sectors (all levels).
7. Land use nature and biodiversity	The very dense settlement of the Czech landscape (6 254 municipalities) greatly influences further construction and land occupation > limited space for the construction of ecological projects (wind power plants etc.) (Czech Republic). 7.1 Conflicts of interest between nature conservation and urban development (Ministry of the Environment). 7.2 Lack of financial and political support for community and NGO programmes (Ministry of the Environment, regions, cities etc.) 7.3 Programs and funding is not flexible enough to allow for pre-funding of projects (Ministry of the Environment, regions, cities etc.) 7.4 Inadequate protection of agricultural land, poorly set subsidy environment for farmers (Ministry of Agriculture). 7.5 Poor Forest management - poor condition of forests in general (need to escalate natural processes of degradation and planting, not planting trees appropriate to natural conditions, etc.), poor condition of forests (Ministry	7.7 Protection and improvement of biodiversity (Ministry of the Environment). 7.8 Increased attractiveness of urban spaces for residents (Ministry of Regional Development). 7.9 Potential for ecotourism development (Ministry of Regional Development). 7.10 Improved quality of life through accessible green spaces and recreational zones (Ministry of the Environment, Ministry of Health). 7.11 Need for long-term and stable investments, with support for NGOs – mainly for ex-ante subsidies for projects (Ministry of the Environment). extension of nature protection zones (nature reserves) 7.12 Systematic support for species protection and elimination of invasive species (Ministry of Environment, regions, cities, NGOs) 7.13 Support for nature conservation organizations, education in areas of the protection of nature (all levels) 7.14 Strengthen the Nature Restoration Law in the Czech Republic (Ministry of Environment)

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
	of Agriculture, Lesy České republiky, forest owners). 7.6 Very poor water quality in rivers (all levels).	
8. Education and awareness	8.1 Insufficient public awareness and interest in climate change (Ministry of Education, Youth, and Sports). 8.2 Challenges in communicating complex information (Ministry of Education, Youth, and Sports, Ministry of the Environment). 8.3 Limited resources for educational campaigns (Ministry of Education, Youth and Sports, Ministry of Finance). 8.4 High level of misinformation spread in relation to climate, lack of education of people, lack of communication (all levels)	8.5 Increased awareness of the importance of climate measures (Ministry of Education, Youth, and Sports, Ministry of the Environment). 8.6 Strengthened citizen engagement (relevant ministries, regions, municipal level, education infrastructure, communities). 8.7 Introduce comprehensive climate education in schools (Ministry of Education, Youth, and Sports, Ministry of the Environment), Municipalities/Universities can create tailored climate education programs that address local environmental issues and solutions, fostering a community-centric approach to climate awareness. 8.8 Opportunity for collaboration with local schools and organizations (all levels). 8.9 Creation of innovative climate-friendly programs (all levels). 8.10 Establish collaborations with local universities and research institutions to provide expert knowledge, resources, and support for climate education initiatives. Possibility of organizing competitions and challenges focused on climate action, encouraging students to produce innovative solutions to local environmental problems. 8.11 Utilize digital tools and online resources to enhance climate education,

Identifying specific barriers and opportunities for each sector		
Sector	**Barriers**	**Opportunities**
		including interactive learning platforms, virtual field trips, and educational apps.(regional, local level)
9. International agreements and legislation	9.1 Complex and constantly changing legislation (Ministry of the Environment, Ministry of Foreign Affairs, other ministries). 9.2 Need to align national and local policies and strategies (Ministry of the Environment, Ministry of Regional Development). 9.3 Many strategies and concepts that contribute to the opacity of not only climate policies. 9.4 Poor connotation and public perception of European regulations and directives - poor publicity and populism often distort the needs and focus of these documents.	9.5 Potential for support from international funds/grants/programs (all levels) 9.6 Settle strict regulations and penalties for not meeting targets (Ministry of the Environment). 9.7 Collaborative creation of cross-regional platforms to help each other on the path to climate neutrality (municipal level).
10. Interdisciplinary (all levels)	10.1 Insufficient coordination between different sectors and organizations. 10.2 Communication barriers and differing priorities (mainly political). 10.3 Lack of integrated data and information for decision-making.	10.4 Creation of comprehensive and effective solutions, data mining etc. 10.5 Strengthened intersectoral collaboration. 10.6 Creation of an integrated approach to sustainable (urban) development.

In the sector of **climate change**, particularly in Liberec, there is significant potential for adopting novel approaches to capital planning, including the exploration of new financial instruments and grant schemes beyond traditional operational programmes. In recent months, we have started to embrace this original approach, gaining our first experience with Horizon funding, and successfully submitting a

proposal to the European Cities Facility to enhance our internal capacities. Regarding operational programmes, the most crucial ones are the Operational Programme Environment (OPE) and the Integrated Regional Operational Programme. However, a significant challenge is the relatively high municipal co-funding required for projects funded by OPE. Moving forward, we need to focus more on multi-source funding and the involvement of private capital, including investments from the industrial sector and citizen capital, to support decarbonization efforts.

In the field of buildings, there are several specific opportunities that could enable noteworthy progress in the coming years. The Social Climate Fund is expected to increase investments in building refurbishments, which are essential for improving energy efficiency. Additionally, a new Housing Strategy is currently under development, which will likely incorporate the ambition to make Liberec a climate-neutral city and ensure the implementation of the Energy Performance of Buildings Directive. For municipal buildings, a major opportunity lies in the concept of Energy Performance Contracting (EPC). Nearly 40 municipal buildings in the city have been selected for energy-saving measures, and solar panels will be installed on the roofs of some of these buildings. For privately-owned buildings, the development of community energy in Liberec and the establishment of a service and management organization for this community will have a significant impact. This organization will also be responsible for raising awareness about renewable energy construction and energy savings across the city. A manager will be appointed to handle communication with housing cooperatives regarding this agenda. Moreover, the use of new financial instruments is expected to increase the city's overall capacity. For example, EUCF funding is aimed at boosting energy savings in buildings and public lighting, which will further enhance the city's ability to achieve its climate goals.

Transport and mobility in Liberec is set to benefit from recent activities aimed at increasing traffic safety, particularly in the area of active mobility. Moving forward, the city's focus will be on electrification, encompassing private passenger cars, public transport, and freight transport. We currently have two projects dedicated to advancing this field, and our Pilot City project also focuses on this topic.

There is a strong connection to community energy development, where we are awaiting the final wording of legislation crucial for Vehicle-to-Grid (V2G) technology. In addition to electrification, public transport will also rely on biogas produced by a new biogas station, further supporting our sustainability goals.

Energy sector is currently undergoing significant development, with a strong focus on the construction of renewable energy sources (RES) and community energy development. These efforts are expected to help address energy poverty, enhance energy independence, and improve energy security. This project, along with other related activities, is also contributing to the creation of new jobs in the renewable energy and construction sectors. Additionally, the establishment of a one-stop shop for housing is anticipated to raise awareness about climate neutrality and facilitate greater community engagement in achieving these goals.

In the sector of **waste management**, there remains significant potential for the reuse of materials and resources, including the testing of innovative technologies, particularly in connection with the production

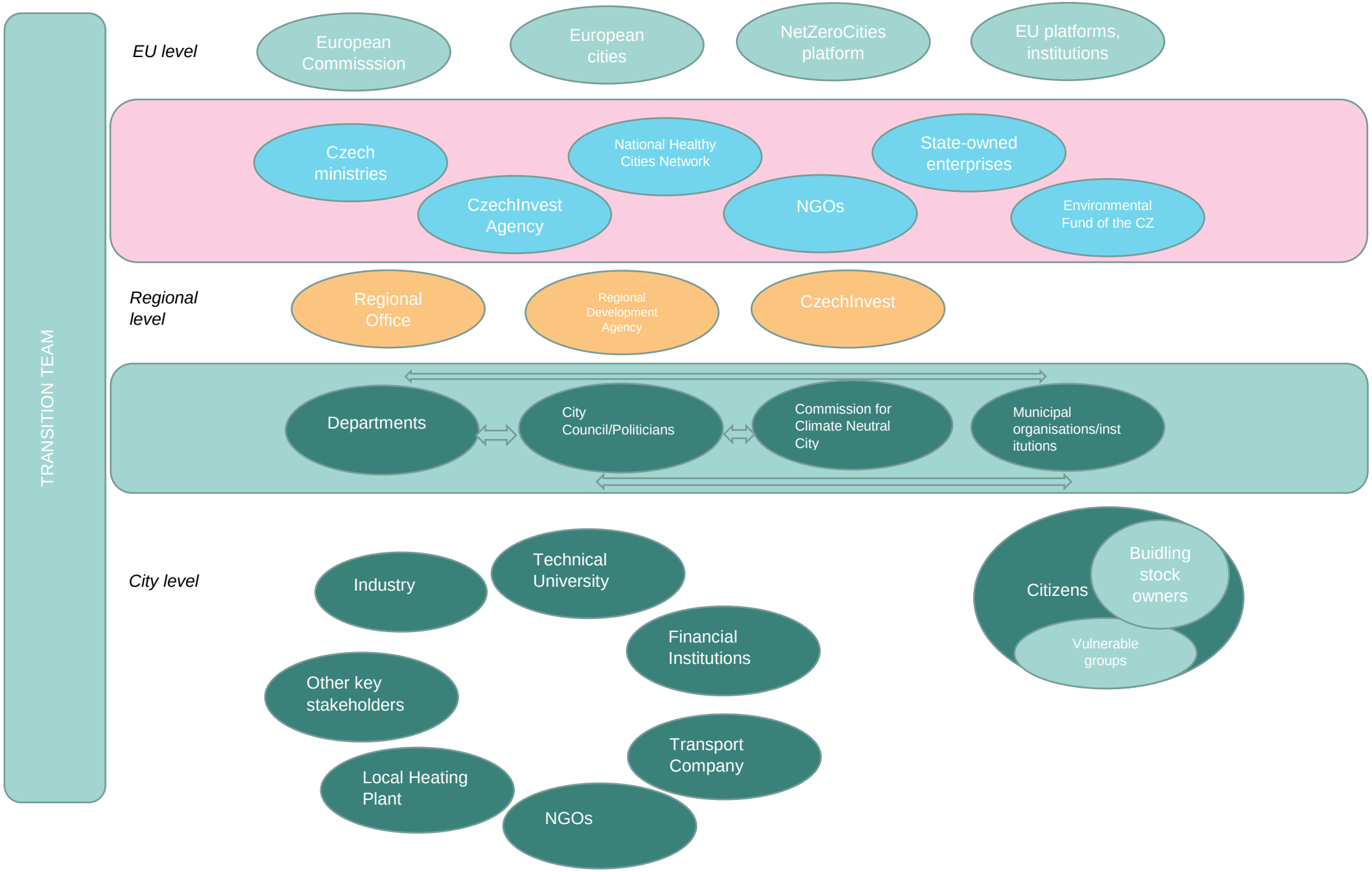
of construction materials. Additionally, there is an opportunity to improve stormwater management in the city, which could further enhance sustainability efforts and resource efficiency.

Industry and business is a sector where significant changes can be expected. On one hand, this sector is driven by EU regulations; on the other, it involves following overall market trends and focusing on competitiveness (including the entire production cycle and CSR). In Liberec, we see enormous potential in developing cooperation with industry and business. Together, we can introduce innovative technologies to the city, collaborate in the field of public education, and use start-ups to test innovative technologies in municipal activities, etc.

In the area of land use, **nature, and biodiversity**, there is a significant opportunity through effective coordination between the CCC and the Adaptation Strategy. Furthermore, a municipal manual on public spaces has been developed, with a focus on green-blue infrastructure, which is expected to have a positive impact in this area.

Education and raising awareness are crucial for driving behavioural change. In this field, we plan to cooperate with many stakeholders at the local, regional, and national levels. It is important to educate the public, including professionals, to ensure that their decision-making aligns with the climate-neutrality ambition and contributes positively to the aforementioned fields of action.

The picture below illustrates our view of the overall environment relevant to the mission and our climate-neutral ambition. It represents the current situation and identifies the stakeholders that are most important at this stage. It is clear that this system will evolve as part of the learning cycle—new stakeholders may be identified, and there are existing stakeholders who still need to be engaged.


TRANSITION TEAM
EU level
European Commisssion
European cities
NetZeroCities platform
EU platforms, institutions
Czech ministries
National Healthy Cities Network
State-owned enterprises
CzechInvest Agency
NGOs
Environmental Fund of the CZ
Regional level
Regional Office
Regional Development Agency
CzechInvest
Departments
City Council/Politicians
Commission for Climate Neutral City
Municipal organisations/institutions
City level
Industry
Technical University
Financial Institutions
Other key stakeholders
Transport Company
Local Heating Plant
NGOs
Citizens
Buidling stock owners
Vulnerable groups

The picture above presents the urban system in the context of its relationships at the regional, national, and European levels, and it also highlights the transition team involved in this process.

At city level, there are **politicians**, i.e. **decision makers at strategic level**, and various **municipal departments working at the operational level**. It can be stated that the city council holds decision-making power, with representation from both the leading political coalition and the political opposition. The city council has established various committees to discuss topics in more detail. In relation to the goal of achieving climate neutrality, the Commission for Climate Neutral City and the Committee for Smart City have been established. Additionally, in the context of climate neutrality, the Committee for Transport and the Committee for Local Agenda 21 are also important (including civic society and participation topics).

The Commission for Climate Neutral City is the most important body at the city level. It includes representatives from both the leading political coalition and the opposition, ensuring broad acceptance and effective decision-making. The commission brings together representatives from various fields of action: the energy sector and buildings (including the representative responsible for community energy development and the head of the board of Teplárna Liberec), civic society, a non-profit organization focused on climate neutrality (Rodiče pro klima, or Parents for Climate), the business sector, the Regional Office deputy responsible for the Environment and Agriculture for the entire Liberec region, and a research representative specializing in environmental studies, particularly anthropogenic pollution. This commission is responsible for discussing all topics and issues relevant to the city's participation in the EU Mission and its climate-neutral agenda. It works closely with the mission coordinator/climate specialist from the department of strategic development and subsidies.

In general, it is crucial to maintain a steady flow of information among all municipal departments and to ensure proper connections between them. Regarding climate neutrality, the most important cooperation involves the following departments: the Architecture Office of the City, the Department of Ecology and Public Space, the Economics Department, the Energy Management Department, the Public Property Management Department, the Department of Strategic Development and Subsidies, and the Department of Spatial Planning. At the beginning of the city's participation in the EU Mission, a specific training session on climate change, called "Climate Fresk," was organized for all municipal leadership and other relevant employees. This training proved to be highly effective. We plan to organize the Climate Fresk or similar educational sessions again for other city employees, as it is essential to raise awareness and commitment across the entire city hall (and beyond).

Furthermore, Liberec has a strong tradition of Local Agenda 21, which is connected to the city's participation in the Czech National Healthy Cities Network and its participatory budgeting initiatives. Regular citizens' meetings, Healthy Cities campaigns, and other events, such as European Mobility Week, are held annually. These activities include various inquiries and the creation of feeling maps to gather citizen input. Citizens are used to submit their projects (there are big projects in amount of around 80 000 EUR and various smaller projects in amounts around 8 000 EUR). The goal of this initiative is to engage citizens in decision-making about public spaces in Liberec, with the intention of improving and creating green public spaces that foster a sense of community and belonging. This, in turn, aims to revive public spaces, support the community, and promote active mobility.

In addition, there are various **municipal organizations and institutions** that are fully or partially owned by the city. These entities typically manage or own technical infrastructure and are responsible for social housing, other social services, culture, sports, and education (including kindergartens and elementary schools). In the context of climate neutrality, among the municipal organizations almost fully owned by the city, the most important is the **public transport provider**, Dopravní podnik měst Liberec a Jablonec nad Nisou (DPMLJ), which is fully responsible for ensuring public transport in the city.

Among the municipal organizations where the city has a minority ownership stake, the most significant are the heating plant **Teplárna Liberec** and the Regional Hospital Liberec. The heating plant, in particular, can be considered a frontrunner in the city's decarbonization efforts. Teplárna Liberec works closely with the city, with its head of board serving as a member of the Commission for Climate Neutral City. The plant is a key partner in community energy development, provides central heat supply to most households, and is also responsible for heating decarbonisation (GreenNet projects).

At the municipal level, other important stakeholders include the **Technical University of Libere**c, which plays a key role not only in research, science, and innovation but also in training and educating new professionals for the regional labour market. The university's involvement is crucial for fostering innovation and ensuring that the regional workforce is well-prepared to meet future challenges, particularly in fields related to climate neutrality and sustainable development.

Important stakeholders in the field of decarbonization also include those from the industry sector, particularly enterprises that have already committed to CO_2 emissions reduction/cut, **financial sector** co-funding the future development etc.

Citizens play a specific and crucial role in achieving climate neutrality, as it is fundamentally tied to their daily choices and decision-making. This underscores the need for a shared vision and goals, which must be built on mutual interaction, communication, motivation, and public education. Within the CCC AP portfolio, citizens are also seen as building stock owners, making it essential to engage them in discussions about building refurbishment and the construction of renewable energy sources (RES). Additionally, there is a focus on addressing energy poverty and the risk of social exclusion, with vulnerable groups of citizens being a particularly important subgroup to consider in these efforts.

In the context of public administration, Liberec is the “capital” of the Liberec region and regarding this, important stakeholder is the Regional Office of the Liberec region. There are many natural ties and connections between the municipality and the region, and since Liberec is the largest city in the region, many projects and activities implemented by the Regional Office have a direct and significant impact on the city. This includes measures related to buildings, as the Regional Office is responsible for high schools and cultural buildings, most of which are located in Liberec. The city and the region cooperate in areas such as community energy and public education.

Another important stakeholder at the regional level is the Regional Development Agency, which is fully owned by the Liberec Region and operates as an "in-house company" with the aim of serving the region, its inhabitants, economic entities, and institutions. The Agency also oversees the business incubator Lipo.ink and a coworking centre. The city collaborates with this Agency primarily in the field of energy, working together on the regional "energy platform," as well as in public education and information sharing related to climate change and energy. We plan to further cooperate with the Agency in the area of public education and awareness-raising on energy issues, organizing workshops for the public.

At the national level, **Ministry of the Environment, Ministry for Regional Development, Ministry of Industry and Trade, Ministry of Education, Youth and Sport are important players in the field of climate neutrality**. At this level, there is crucial mutual support and cooperation. We have started to push cross-departmental cooperation and to discuss the initiation of the platform aiming at support of Czech cities pursuing the climate neutrality. This platform shall support Liberec and the city’s role should be to share knowledge and experience among Czech cities. This task involves the Ministry for the Regional Development. With Ministry of the Environment, there has been discussed various subsidy titles and programmes since Liberec (and other Czech cities with climate neutrality ambition) needs to be provided by some supportive, specific conditions as higher percentage of subsidies, new subsidy titles etc. to enable reaching our goal. Ministry of Industry and Trade cooperates with Liberec in the field of innovation and smart solutions and regarding this, key role has **CzechInvest: Business and Investment Development Agency**.

Regarding topics relevant to climate neutrality, there are some state-owned enterprises that are also our stakeholders as for example Forests of the Czech Republic. Regarding the participation, public education and similar topics, there has very important role the **National Healthy Cites Network** (best practice transfer among Czech cities) that is a partner in the CapaCITIES project aiming and building capacities for the Climate Neutral and Smart Cities, beside mentioned network also various **non-governmental organizations** responsible mainly for raising awareness in public and pushing for legislation and administrative changes at the national level. Under these organizations fall for example The Community Energy Union (interest group bringing together professionals with a wide range of knowledge and experience), Hnutí DUHA – friends of the Earth of the Czech Republic, Climate Coalition (platform of Czech non-governmental non-profit organizations that deal mainly with climate and

environmental protection, mitigation and adaptation, social aspects of the climate crisis, development cooperation and humanitarian aid.

The **EU level** influences our ambition with the legislation and preparation of many grant titles, schemes, and programmes. Obviously, in general, there are European institutions building the environment in which we work and cooperate. Specific stakeholders are other European cities that are connected with Liberec in a certain way – we cooperate in case of specific research projects, in various twinning programmes, we share our knowledge and experience both regularly and occasionally. All these kinds of experience help to form our opinions, ways how to work and help to learn about new opportunities, possibilities, best practice solutions and ways of cooperation.

Follow-up information, based on above mentioned description of the system, are in following table listing key stakeholders mapping at the local, regional, national, and European level.

Each stakeholder is defined by emission domain, key factors, its influence on the city and its interests. Influence is valuated on a scale 1 – 3, when 1 represents incredibly low impact on the city, two represents average influence and 3 represents high impact on the city.

A-3.2: Systems & stakeholder mapping			
System	**Stakeholders**	**Influence on the city´s climate neutrality ambition**	**Interest in the city´s climate neutrality ambition**
Transportation	Dopravní podnik měst Liberec a Jablonec nad Nisou, a.s. (DPMLJ)	DPMLJ is a main public transport company (city is a majority owner, i.e. over 99 %), this company operates the municipal public transport in Liberec including neighbouring municipalities and tram line to the city of Jablonec nad Nisou. Except the transportation system, DPMLJ will be important stakeholder in case of community energy (in the field of public fleet greening)	3
Energy	Teplárna Liberec, a.s.	This company (heating plant) is a main supplier of heat (households, customers for tertiary sector, industrial enterprises). The company is partially owned by the city (23,96 %) and is a part of the international group ENETIQA. This company is key stakeholder of the city in case of energy, key partner in case of community energy development and in general, municipal frontrunner in case of innovative and pilot projects	3
Energy	Community Energy Service and Management organization	The umbrella organisation covering and managing energy community/communities in Liberec and serving as advisory body/on-stop-shop for citizens. Main goal of this organization will be to cover all activities in the field of community energy administration (billing, accounting), management of energy flows, service, communication with communities' members etc.). Such organization needs to have specific know-how, competences, and appropriate technical equipment. Following special analysis, it seems to be best option to establish a community for renewable resources which would take the legal form for of a cooperative. This organization shall be established in September 2024.	3
Energy and circular economy	TERMIZO, a.s.	TERMIZO is the incinerator and is a part of central heat supply in the city. It is connected with the heating plant Teplárna Liberec technical. This incinerator is one of 3 big incinerators in the Czechia using municipal waste for heat, warm water and electricity producing	3
Policy and Governance	Regional office of the Liberec Region	City is a part of the Liberec Region, i.e. this stakeholder represents higher authority and in case of climate-neutrality ambition, there are strong (and natural) connections in the field of public education,	3

A-3.2: Systems & stakeholder mapping			
System	**Stakeholders**	**Influence on the city´s climate neutrality ambition**	**Interest in the city´s climate neutrality ambition**
		buildings' refurbishment, public transport, and regional subsidy programmes aiming at buildings, i.e. heat sources replacements above all	
Policy and Governance	Ministry of the Environment of the Czech Republic	Ministry is the central body of the state administration and the body of supreme supervision in matters of the environment. It provides various subsidies and loans for environmental protection, the city mainly uses programmes for energy savings and renewable energy sources and thus, in case of buildings' refurbishment a role of this ministry is crucial	3
Policy and Governance	Ministry for Regional Development of the Czech Republic	Ministry is the central body of the regional policy and regional development and as such, plays key role in setting up the overall rules and opportunities for regional development. Liberec cooperates with this ministry in the field of developing new national platform supporting Czech cities with climate-neutrality ambition and in the field of negotiation of further support for Liberec	3
Policy and Governance	Ministry of Trade and Industry of the Czech Republic	Ministry is (besides other responsibilities) central body for industry and energy policy and new technologies support, in case of buildings a body responsible for developing new strategy based on the EPBD. Liberec started to cooperate with this ministry closely to support city's innovation environment and to implement some pilot projects	3
Policy and Governance	State Environmental Fund of the Czech Republic	This institution funds environmental investments, mainly in the form of subsidies and loans (water quality improvement, air quality, waste management etc.), ensures drawdown from the EU structural funds and administrates the subsidy title New Green Savings. This subsidy title is crucial for households in Liberec to support them in the field of energy savings and construction of FVE	3
Industry and Business	Industrial enterprises	There are two industrial zones in the city, which are connected to public transport lines. In Liberec, mainly automotive and the production of plastic parts operate. A large number of companies received support in the form of investment conditions or are involved in innovation projects co-financed by the Czech Republic. Individual companies have close supplier-customer relationships and cooperate	3

A-3.2: Systems & stakeholder mapping			
System	**Stakeholders**	**Influence on the city´s climate neutrality ambition**	**Interest in the city´s climate neutrality ambition**
		with each other. Both large, medium, and small companies operate here. These companies are significantly affected by the new EU legislation (green taxonomy). There is still immense potential for further communication and cooperation, in this field city want to use the Regional Development Agency and CzechInvest	
Health	Krajská nemocnice Liberec (KNL - Liberec Regional Hospital)	The Liberec Regional Hospital is the largest medical facility in the Liberec Region, it unites the Liberec Hospital, the Turnov Hospital, and the Frýdlant Hospital. At the same time, it is one of the largest employers and emitters of greenhouse gases in the city. KNL has joined the Global Green and Healthy Hospital initiative that networks organizations dedicated to reducing their environmental footprint and promoting public and environmental health	2
Science, Research, and Innovation	Technical University of Liberec	The university is the only university in the region, consists of seven faculties and cooperates with many foreign institutions. Within the context of the mission, the Faculty of Arts and Architecture, the Faculty of Mechanical Engineering (Department of Energy Devices, Department of Materials, Department of Engineering Technology, Department of Production Systems and Automation), Institute for Nanomaterials, Advanced Technologies and Innovations are of particular importance. The university is the city's partner in case of the pilot project concerned with the community energy development, important stakeholder in case of raising overall awareness about climate neutrality and community energy, in the field of dissemination and raising new experts in the field of energy which is currently a barrier (insufficient number of professionals in energy)	3
Policy and Governance ; Science, Research, and Innovation	ARR - Agentura regionálního rozvoje (Regional Development Agency)	This company is fully owned by the Liberec region. It provides advice and preparation for subsidy projects in the field of science, research and innovation, supports start-up entrepreneurs and regional companies within the Lipo.Ink business incubator, supports tourism in the region and, last but not least, the innovation ecosystem of the region in accordance with the National Research and Innovation	2

A-3.2: Systems & stakeholder mapping			
System	**Stakeholders**	**Influence on the city´s climate neutrality ambition**	**Interest in the city´s climate neutrality ambition**
		Strategy for intelligent specialization of the Czech Republic. In the context of Liberec' mission, ARR is a key partner in the field of public education and raising awareness about climate neutrality, we plan to organize various workshops (energy) together, the city is connected with ARR also via the Community Energy platform	
Policy and Governance	NetZeroCities platform	The platform mainly supports European cities in reducing greenhouse gas emissions with the aim of achieving climate neutrality. The platform is part of the Horizon 2020 programme.	2
Industry and Business/ Science, Research, and Innovation	CzechInvest Agency	The agency is a body for business and investment support (at the regional, national, and international level). It is a state-funded organization subordinate to the Ministry of Industry and Trade of the Czech Republic. Liberec plans to cooperate more with this agency to support innovations and to use start-ups within the city's ambition.	2
Entrepreneurship/innovation	Regional Chamber of Commerce	The Chamber of Commerce strives to support and develop the business environment, it operates mainly through district chambers of commerce. It is part of the Chamber of Commerce of the Czech Republic.	1
Civic society	Non-profit organisations	There are many non-profit organizations active in the city, which are also active in the field of the environment. They represent a strong interest group, form the professional public, participate in conceptual and strategic planning of the city's development, are members of various advisory working groups, etc. The Climate Coalition, Parents for the Climate, Re-set, People in Need, and others are especially important in the city.	1
Policy and Governance ; Civic society	Centrum bydlení Liberec (Housing Centre of Liberec)	Housing centre of Liberec is a contact point for housing which serves for support of persons and households in housing need and of low-income groups in Liberec and also has a role of preventing housing loss. And for these purposes they work closely with relevant social services providers.	2

A-3.2: Systems & stakeholder mapping			
System	**Stakeholders**	**Influence on the city´s climate neutrality ambition**	**Interest in the city´s climate neutrality ambition**
		In case of social housing, which is important in Liberec, there is focus on energy savings and public education in this field. This centre is a key stakeholder in the field of vulnerable groups of citizens in Liberec, mainly in connection to community planning of social services.	
Civic society	Citizens of the city	Citizens of the city (107,389 by 2023). Overall problem is aging of the population (average age of the population 42.1 years), in case of educational structure, almost 60% have completed secondary education (the share of university educated is 15%) which can be seen as a good precondition for necessary behavioural change. Participatory system with citizens is described below in part 4.	3
Policy and Governance ; Infrastructure	Municipal organisations/public benefit organizations	Municipal organizations are public non-profit organizations, mainly kindergartens and elementary schools. They are important decision-makers/managers in case of municipal property, they are responsible for management of public infrastructure when there they need to be in compliance with municipal policy and regulation. These stakeholders were beneficiaries of subsidies from the OP Environment in last years, leading to energy savings on buildings. Since the sector of buildings is important in Liberec, there needs to be follow up in case of appropriate energy management and continuity in buildings' refurbishment.	3
Policy and Governance	Politicians/city counsellors	Politicians, i.e. city counsellors, representatives of leading political parties and opposition as well. They have the decision-making power and thus, they need to be educated properly to decide under the complex information background and knowledge. They need to follow the coalition agreement and citizens' opinions and priorities obtained from participative processes.	3
Buildings ; Energy	Housing cooperatives	These organisations are legal entities focused on housing, they provide their members with housing needs, manage the buildings with apartments and have the decision-making power in this case. These stakeholders are crucial in the field of energy and mainly community energy (including RES construction). City needs to communicate with	3

A-3.2: Systems & stakeholder mapping			
System	**Stakeholders**	**Influence on the city´s climate neutrality ambition**	**Interest in the city´s climate neutrality ambition**
		them very intensively and this is why under the community energy service and management organization will be established a position of a mediator responsible for activisation of those associations (raising awareness, building mutual trust), also a marketing and PR campaign will be focused on these stakeholders, a survey about their expectation and barriers as well	
Waste management	FCC Liberec (private company)	FCC Liberec is a private company that provides comprehensive services in waste management for the city (long term contract based on public procurement). Company provides collection of municipal waste, separated waste, hazardous waste, and bulky waste, etc. It also provides environmental education in the field of waste management. This company is quite innovative one and is focused on new technologies in all processes. In 2025, in Liberec will be new public procurement for waste management provider. Thus, this company has informational embargo because of their competition.	2
Infrastructure ; Public greenery ; Public space	Technické služby města Liberec (Municipal Technical Services – public benefit organisation)	This public benefit organisation provides services mainly in the field of roads maintenance, public greenery maintenance, traffic signs maintenance, winter maintenance etc. This organisation is interested in hydrogen testing, they developed a pilot project in this area (they plan to construct FVE on their buildings' roofs and surpluses use for the hydrogen economy/system)	2
Public space	Lesy ČR (state-owned company – Forests of the Czech Republic)	Main goal of this enterprise is management of state-owned forest property and watercourses and streams (based on sustainable forest management). For our emissions model was important a value (area) of new planting of trees in Liberec cadastral area in period of 2024 – 2030, mainly because of carbon sequestration.	2
Public space	Městské lesy Liberec (Urban Forests of Liberec, public benefit organisation)	This organisation manages the forest property of the city (in a way to develop the multifunctionality of the forest), also carries out educational activities and programmes that are aimed at different age groups and cooperates closely with Lesy ČR and ecological educational centre in Liberec.	1

A-3.2: Systems & stakeholder mapping			
System	**Stakeholders**	**Influence on the city´s climate neutrality ambition**	**Interest in the city´s climate neutrality ambition**
Public space	Zoo Liberec (regional public benefit organization)	This organization is a public benefit organization of the Liberec region (former municipal public benefit organization), it a particularly important regional cultural organization and touristic spot, in case of climate-neutrality mission is important since is very energy consuming and needs huge investments into the energy efficiency (mainly of various pavilions)	1
Energy ; Policy and Governance ; Civic society	Unie komunitní energetiky (Community Energy Union – UKEN)	UKEN is an interest group bringing together experts, representatives of local governments, companies, and professional associations (energy, environment, construction). This stakeholder is important for development of community energy, Liberec became a member in 2023 to be able to push the legislation and regulation in this field.	2

3 Part B – Pathways towards Climate Neutrality by 2030

Part B represents the core of the CCC 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.

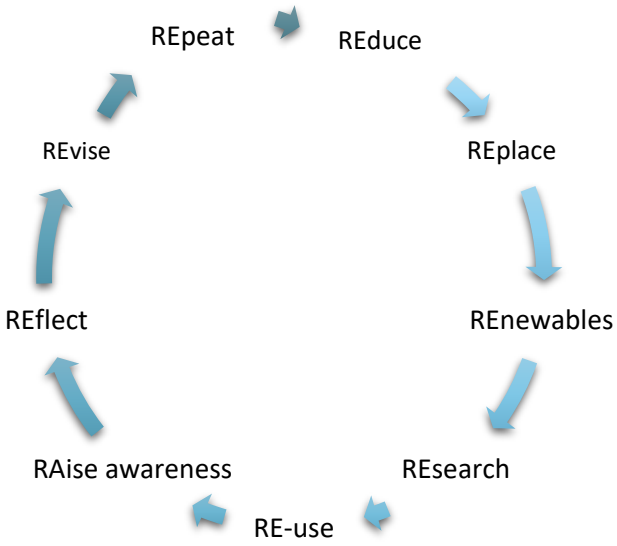
3.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

Module B-1 “Climate Neutrality Scenarios and Impact Pathways” lists and describes impact pathways, early and late outcomes, and direct and indirect impacts (co-benefits) according to and adapted from the NetZeroCities Theory of Change and the CCC Action Plan Guidance – clustered by fields of action.

List of impact pathways, selected from or inspired by the NetZeroCities Theory of Change, including early and late outcomes (strategic objectives) and levers of change structured along the fields of action.

Description of the impact pathways, summarising their relationship with the key priorities and strategic interventions and with the analysis developed in Part A, is fully in line with theory of change and transition map logic. Such impact logic (theory of change) is about multiple (transversal) levers (technological innovation and infrastructure; finance and funding; social innovation; democracy and participation; governance innovation; learning, capacities and capabilities building, enabling transformative change. Portfolio of Actions brings various early outcomes and later outcomes, which culminate into long-term impacts including direct benefits and co-benefits. These casual chains represent the so-called Impact Pathways.

Table B 1-1 lists all suggested pathways and covers all fields of action, aligned with the emission inventory results, as well as actions across various systemic levers. The proposed activities are linked to both short- and mid-term changes—i.e., early changes and later outcomes over a 3–4-year horizon. In addition to the direct impacts, such as emission reductions, there are also various indirect impacts (co-benefits) including improvements in citizens' health, quality of life, economic benefits through job creation, and financial savings.



The whole process of green transition of the city is built on several elements, none of which has more weight or priority, all of them must be implemented simultaneously and continuously. The points summarise the implementation and focus of the CCC Action Plan (reduce, replace, renewables, research, re-use, raise awareness) including monitoring, evaluation and a learning process and possible revision of existing measures (reflect, revise, repeat).

Taking into account the current situation in the city (the city's emission inventory and the measures set in the action plan), it is clear that it is necessary to improve the energy performance of buildings and guide society toward responsible and sustainable energy management in everyday processes, including sustainable consumption (REDUCE). At the same time, fossil fuels must be replaced with renewable energy sources, both in buildings and in low/zero-emission transport. Specifically, natural gas must be phased out in the buildings sector, and diesel in the transport sector (REPLACE). Fossil fuels should be replaced by renewable energy sources, with wind energy complementing solar energy (RENEWABLES) to achieve a balanced production profile in line with our commitment. Liberec will also support the city's innovation environment to test and apply new technologies and solutions, cooperating with key stakeholders and actively participating in international projects (RESEARCH). Additionally, the focus will be on the circular economy, sustainable consumption, and efficient waste management (REUSE).

A key part of the entire process is to inform, educate, and share experiences and good practices in order to promote the most desirable society-wide changes, influencing daily decision-making processes and choices in a more sustainable direction, ultimately leading to behavioural change. In addition to educating residents, it is equally important to continuously educate politicians, employees, and city officials so that their decisions and actions are based on comprehensive and high-quality information. Full understanding of the entire system strengthens the city's shared ambition and commitment to achieving climate neutrality (RAISE AWARENESS).

An integral feature of the city's transition is the cyclical process of continuous monitoring, evaluation, and subsequent revision of measures and activities to meet the city's goals (REFLECT). This process

can be summarized as an ongoing cycle centred on the implementation of the CCC Action Plan, reflection on achieved milestones, identification of new challenges, threats, and opportunities, and a learning process that helps to embed these changes as the new norm (REPEAT).

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
Energy systems	Technology /infrastructure	**PV panels on of municipal buildings' roofs** (in line with EPC and its timeline, necessity of buildings' refurbishment, we already mapped the energy savings potential of all municipal buildings and possibility to place PV panels on specific buildings (some are protected as architectural monuments), in mid of 2024, there will be built first PV panels on 10 municipal buildings (buildings that are already completely refurbished). For PV construction, there are available public sources, beside these this could be a possibility to test some new financial ways as crowdfunding in smaller pilot localities in the city. **Phasing out coal boilers in households** (city needs to consider possible motivation for citizens, in last years huge success had „boiler subsidies" for households (intermediary = Liberec region) in this field **Mapping of areas available for large PV plants/wind plants** (currently we plan wind maps developing, there are some limitations given by the spatial planning, protected areas, on the other hand – acceleration zones might give local potential – *in case of wind plants, the crucial part of this measure is participation of citizens since there are some public prejudices and fears of that (part of cross-cutting measure)* **The Pilot project of hydrogen system in the Technical Services of the City of**	**Phasing out remaining coal boilers in households** **Constructed PV panels on roofs of residential and commercial buildings** (it has to be in line with planned reconstruction and EPC) **Large PV plants, wind plants** constructed in the city area. Investments in energy storage technologies to manage supply and demand effectively. **Connecting more heat consumers to the waste to energy plant** (incinerator) **Gradual replacement of natural gas with electricity, biogas, and hydrogen** (which is preconditioned by the construction of the RES in the city and replacement of heat sources/boilers in households, tertiary sector, and industry)	1. Reduced GHG emissions: • The used SECAP methodology of emissions calculation does not allow to separate emissions saved due to improvements in the energy sector. • The emissions reductions are included in mobility & transport and built environment sectors instead. 2. Reduced energy demand, needs, or consumption 3. Increased access to clean, stable, affordable energy 4. Reduced energy poverty	Improved air quality Financial savings/lower bills for energy Increased number of skilled jobs & rate of employment Increase in energy security, independence and stability in the city/focus on local supply chain. Enhanced citizen & communities' participation - hands-on approach in case of citizens and energy sector Increased community cohesion and collaboration through shared ownership and management of energy resources Increased awareness and understanding of energy issues in the community leads to more informed decision making, preventing energy poverty, and also leads to behavioural change and potential savings. Mainstreaming of new economic models like proximity & sharing economy

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		Liberec (the possibility of hydrogen (production by the heating plant and utilization in public transport buses) was considered in 2023 however, the investment into such technology is still too high and city doesn't produce that many renewables to store them into hydrogen, furthermore, heating plant would be capable to produce grey, not green hydrogen. Though, we need to test new solutions for the future). **GreenNet II – III (decarbonisation of heating system)** – responsibility of local heating plant (heating plant continually develops projects leading to decarbonisation of heating system, GreenNet projects are about modernization of the heating networks – steam pipelines – that will be replaced by more economical hot pipelines, mostly underground, this represents measure leading to CO2 reduction and meeting better demands of customers **Biogas station construction**, this biogas station should be constructed in 2027, there is potential to produce 17.000 mWh/y of biogas, this station should be a part of community energy concept, and its primary goal is to produce biogas for public transport provider.			

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
	Governance & policy	**Energy management development** with the focus on continual improvement of municipal energy management leading to the ISO EU 50 001 certification. For this measure, we will develop investment concepts under the EUCF/LIFE programme funding, which should attract private investors. The establishment of a Community Energy Service and Management Organization aims to develop community energy initiatives in the city, currently overseen by the city's energy management department. This organization will serve as an advisory body and a one-stop shop for citizens, providing comprehensive support and information. A key feature of this organization will be the inclusion of a mediator dedicated to facilitating communication and collaboration with housing cooperatives in Liberec, ensuring effective stakeholder engagement and tailored energy solutions. This approach will incorporate service design principles, involving citizens and local organizations in the co-creation and continuous improvement of energy services.	**Hands-on approach in case of citizens (SMEs) and local energy sector**, strong support for community energy including public and private bodies and households (building trust and understanding is a precondition for successful implementation, i.e. acceptance of this concept by citizens). Strengthened public understanding, knowledge in this field. Utilization of this concept (community energy) as a tangible project with clear benefits (lower energy prices) for building commonly shared vision of Climate neutral city (project enabling further communication in many cases) **Higher investments from private sector/households** into energy efficiency measures and RES construction/increase in number of buildings on which are implemented measures leading to		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
			energy savings or RES construction. **Contribution to building innovation environment** in Liberec via various common pilot projects with key stakeholders leading to strengthened cooperation/relationship.		
	Capacity and Capability building	**Involvement/hiring of an expert responsible for financing (fundraising) local energy transition/business model of community energy development** in general, this involves intense communication with key stakeholders, their engagement in the actions funding, learning new ways of funding across the EU (in line with possibilities given by the Czech legislation) – networking to push appropriate legislation amendments (including policy labs) and utilization of the NZC Capital Hub in general (to increase our technical expertise a knowledge)	**Increase in expertise** within the city hall, increase in finance/funding and testing new financial instruments for funding projects demanding involvement of private capital – **change in municipal capital planning and capital deployment** and engagement of key stakeholders and investors of propriate actions.		Better utilisation of available financing options Increased number of skilled jobs & rate of employment Learning new approach to capital planning Increase in private investments. Stronger citizens' commitment via ownership (citizen capital engagement – RES construction) Financial savings Building functional relationships with key stakeholders (commonly shared commitment and vision) leading to higher commitment and to increase in co-design and co-fund of Climate actions
	Learning and capabilities	**Twinning programme and Sensemaking activities** (Initiation of Sustainable Energy community for the City of Liberec) – utilization of knowledge and experience gained from abroad in this field, the pilot city project is a pioneer activity for Liberec, showing the importance of mutual learning and changing the mindset across the city hall.	**Increase in expertise at the city level and change in the city culture** (new mindset, openness to change, Innovation, new ways how to do thinks and how to cooperate and co-design)		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		Pursuing common projects with key stakeholders (not only local ones) leading to increase in capacity, but city also needs to use their expertise and engage stakeholders' capital in relevant actions, on the opposite, to enable the stakeholders to increase their capacity via cooperation with a mission city having specific opportunities to apply for calls opened only for mission cities **Cooperation with local university and heating plant** (increase in capabilities at municipal level) as local frontrunners in innovative actions			Increased investments in R&I Financial savings Building functional relationship with key stakeholders (shared commitment and vision Increased investments in R&I Bigger acceptance of new approaches, financial innovations including hands-on approach of citizens – energy system more self-sufficient, stable, based on RES
	Finance & funding	**Financial support on regional, national and international levels to energy savings and building local energy sources using RES, for example we plan to apply for** the European Urban Initiative (Energy Transition) for further development of local energy system (which is great opportunity to finance investments into innovative transition) and to complement them with private sources (for example households, industry, others). **This is also connected to testing new financial instruments** as crowdfunding (citizen capital, crowdfunding for RES construction in pilot locality)	**Financial support on regional, national and international levels to energy savings and building local energy sources using RES.** Markable increase in investments into local energy system, change in capital planning where we need to change the approach in case of private capital		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
Mobility & transport	Technology /infrastructure	**Building the infrastructure for charging of EVs** (currently there is a pilot project aiming at construction of charging infrastructure in the city centre) **Development of low emission municipal public transport** will be based on the electrification of a part of public transport fleet and another part of public buses will use biogas as a fuel. In Liberec, there is a tradition of trams, unfortunately, those have quite hight emission coefficients, which is why there has been considered possibility of hybrid trolleybuses, which could replace trams in some parts of the city. **Development of safe infrastructure for pedestrians** (continuation of projects leading to increase in traffic safety, which are connected with smart solutions, pavements and sidewalks constructions, crossings, etc. Furthermore, it includes measures enabling increase in safety in specific areas (camera system) and measures leading to improvement of the attractiveness of public spaces (including greenery etc.) **Developing the city's carsharing services**, increasing the zero-emission vehicle fleet for vulnerable groups, and facilitating their mobility needs. Municipal carsharing (EV cars) will be used to reduce emissions and individual mobility of employees through the sharing mobility program.	Building infrastructure for charging of EVs Development of low emission public city transport Development of safe infrastructure for pedestrians Development of infrastructure for cycling, further support for bike-sharing including electro-bikes Electrification of freight transport Improvement of modal split in favour of public transport and active mobility instead of passenger cars Increase in traffic safety through modernization and smart city projects. Tackling the city centre congestion Developing of the low-emission zones.	1. Reduced GHG emissions • Total envisaged emission reduction of about **89,900 t GHG emissions by 2030** • The figure reflects the decreased emission factor of electricity due to local production from RES. 2. Increased modal shift to public transit, walking, cycling. 3. Decreased modal share of private vehicles. 4. Increased uptake of low-carbon technology vehicles for private, freight, public transport (EVs, e-bikes, hydrogen-fuelled etc.)	Improved air quality Reduced noise pollution Increased road safety Improved quality of life and improved air quality, time savings, citizens‘ health improvement Public space re-design in favour of citizens/residents, pedestrians, in line with adaptation actions (blue-green infrastructure, greening the city) Contribution to liveability of city centre, city centre more attractive for living Participatory approach (strengthened commitment/vision across the city), focus on acceptance of suggested solution both by politicians and residents. Increased investments in R&I Improved movement in the city

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		Development of infrastructure for cycling, further support for bike-sharing including electro-bikes (bike sharing is in Liberec since 2023, although since the city is typical by hilly terrain, there is better utilization of electro-bikes) **Decarbonisation of freight transport**, testing new solutions **Public space re-design and projects leading to calming the city centre down** (new inner circuit that is under construction now)			
	Governance & policy	**Decree on freight transport** (continuous negotiation with industry sector in Liberec)			
	Social innovation	**Development of a new mobility model** (ELABORATOR) Parking regulation in housing estates	Limited access of non-residential cars, a smaller number of car trips, increase in traffic safety, support to active mobility		
	Learning and capabilities	**Twinning programme** (ELABORATOR project), replication of solution from pilot city (lighthouse city)	Verified solution tested in pilot locality in Liberec – supporting new solutions in the city		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
	Democracy/par-ticipation	**Sustainable mobility, low-emission and zero-emission transport, active mobility, etc., as a part of the comprehensive system of participation and public education** that will be established, co-creation of public space with various traffic participants including vulnerable groups of citizens	Raising awareness about sustainable mobility, which is accepted and supported by public/society, leading to increase in investments into sustainable mobility		
	Finance & funding	**Financial support on regional, national, and international levels** to low emission vehicles and charging, biogas, and hydrogen infrastructure	Financial support on regional, national, and international levels to low emission vehicles and charging, biogas, and hydrogen infrastructure **Support of transport services for vulnerable groups of citizens from the Social Climate Fund** (public transportation on the city outskirts)		
Waste & circular economy	Technology /infrastructure	**Higher level of municipal waste sorting**	**Better utilisation of secondary raw materials from the municipal waste**	Reduced energy demand, needs, or consumption	Improved waste management and efficiency Increased deployment of material cycles & circular economy Improved air-quality Citizens gain a deeper understanding of the waste management process, from collection and sorting to recycling and disposal.
	Governance & policy	**Incorporation of specific standards demands on municipal waste management provider, into the municipal policy and into the public procurement** (municipal waste management provider) in 2025. **Create a networking platform for companies that can create a circular hub.**	**Municipal waste management fully in compliance with circular economy demands**		
	Social innovation	**Food Waste Reduction Programs,** implement programs that collect and	Involve community groups and **local volunteers in planning and executing**		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		redistribute surplus food from businesses and households to those in need. **The Company visits for wide public and Waste Management Tours Program,** which aims to educate citizens about waste management processes and the role of companies in recycling and waste reduction. By organizing guided tours of waste management facilities and companies, the program seeks to increase awareness, inspire sustainable practices, and foster a deeper understanding of the waste management industry.	**waste management** events and campaigns.		Participants see waste management technologies and practices firsthand, which reinforces theoretical knowledge with practical experience. Informed Decision-Making: Educated citizens are better equipped to make informed decisions about their own waste generation and disposal practices.
	Democracy/par-ticipation	Conduct regular workshops for the general public on topics such as waste segregation, composting at home, and reducing single-use plastics. Organize monthly or quarterly clean-up events where citizens can volunteer to clean public spaces, parks, and streets. Provide necessary tools and equipment. Search for other potential problems and risks associated with waste (e.g. in the landscape, etc.).	Offer **free composting workshops** and distribute compost bins to encourage residents to compost organic waste at home.		
	Finance & funding				
	Learning and capabilities	The **Integrated Waste Management Education and Special Events Program** aims to educate citizens on effective waste management practices and promote community involvement through special events. The goal is to reduce waste			

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		generation, increase recycling rates, and foster a culture of sustainability within the city. Educate through the events, online portal, and other ways to inform citizens about proper waste disposal methods and the benefits of recycling.			
Green infrastructure & nature-based solutions	Technology /infrastructure	**Revitalize the** forests in the city's cadastral area after the bark beetle calamity and restore other green areas. This can be achieved through extensive management of green spaces, including the elimination of non-native species and the **creation of a manual for public green spaces** to make them more air-purifying and conducive to greater carbon sequestration. **Plant new trees and expand existing forested areas within the city's cadastral territory.** Maintain public green areas and **building vertical gardens.** **Supporting water management, wastewater recycling and reuse**, improving water management, utilizing water features and retention basins for cooling urban areas and public spaces. Including the construction of drinking fountains as a prevention against heat. "Replace impermeable surfaces with permeable ones to improve water infiltration. **Improve water management in the city.**	Water/financial savings High-quality public greenery in the city High quality and lush urban greenery which has an impact on the quality of public spaces	Increased carbon sequestration (for e.g., through NBS) Reduced risk to natural/climate disasters or hazards Increased preparedness to uncertainty of climate impacts	Increased urban forestry, plantation & improved plant heath. Reduced heat island effect (public greenery in the city centre)), also improves urban resilience to climate change impacts, such as flooding and heat waves. Access to green spaces contributes to physical and mental health, providing recreational opportunities and reducing urban stress. Enhanced liveability attractiveness/ aesthetics (align with New EU Bauhaus Goals) - Improvement of public spaces, public greenery, improved quality of life for citizens. Improved nature restoration- air and water quality, increased biodiversity, and enhanced urban ecosystems.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
	Governance & policy	**Involvement of requirements leading to an increase in climate resilience into the municipal policy** (manual for public spaces in Liberec)			
	Social innovation	The city will **foster greening city programs: Community-driven green projects** foster social cohesion and strengthen neighbourhood bonds. Example : Adopt-a-Park/Trees Initiatives: Encourage community groups, schools, and local businesses to "adopt" local parks and green spaces, taking responsibility for their upkeep and organizing regular clean-up events. Promote the installation of green roofs and walls on residential and commercial buildings, involving citizens in the design and maintenance. Create an **innovation hub to incubate** and support startups and social enterprises that develop new nature-based solutions and green technologies.	These city programs is the enhancement of social cohesion , neighbourhood bonds and cooperation to co-create new activities.		
	Democracy/par-ticipation	**Participatory budgeting** that is usually involved with projects regarding green infrastructure.	**Increase in investment into green infrastructure in Liberec** including citizens‘ capital (crowdfunding) Engage local businesses through Corporate Social Responsibility (CSR) initiatives to sponsor and support green projects, such as park renovations or urban tree planting programs.		
	Finance & funding				

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
	Learning and capabilities	City residents will gain knowledge about the care of greenery and its benefits through public greening programs.			
Built environment	Technology /infrastructure	**Insulation and revitalisation of buildings in all sectors** (city is typical by quite old housing stock, we need to invest a huge amount of finance into this field, for which we will use all available public sources including New Green Savings programme and future Social Climate Fund from 2026, there is a potential for private investors, we need to engage private capital, which might be case of some mix-use buildings and for this reason we will develop the investment concepts under the EUCF funding) **Modernisation of public lighting using LEDs and intelligent control** (in Liberec, there are still many old sodium lamps that need to be replaced, we plan to use the potential of the modernisation fund as much as possible and to complement this source in accordance with the investment concepts that will be developed for this measure as well) **The energy management of buildings** needs investment concepts to be developed. There is potential for engagement of the private sector in this area. There is still a huge potential for energy management that enables on-time control and measures. Currently, the city only controls energy consumption in municipal buildings via appropriate software, but there is no possibility to react to that information in a	Financial and energy savings for private and public sector, New solutions (software and other devices) implemented on buildings enabling on-time energy consumption monitoring and on-time measures. Meeting hygiene standards. Increased energy savings that will save the public budget.	1. Reduced GHG emissions • Total envisaged emission reduction and compensation of about **560,000 t GHG emissions by 2030.** • The figure reflects the decreased emission factors of electricity and heat due to local production from RES. 2. Increased energy efficiency or rate of retrofit (including district heating) 3. Reduced energy demand, needs, or consumption **4.** Reduced energy poverty	Improvement of health conditions of citizens (buildings' environment) Energy savings – financial savings Increased number of skilled jobs & rate of employment Financial savings - decreased future maintenance & capital costs. Enhanced liveability attractiveness/ aesthetics (align with New EU Bauhaus Goals) Bigger acceptance of modern financial instruments by public/politicians Social inclusion – contribution to social justice, energy poverty

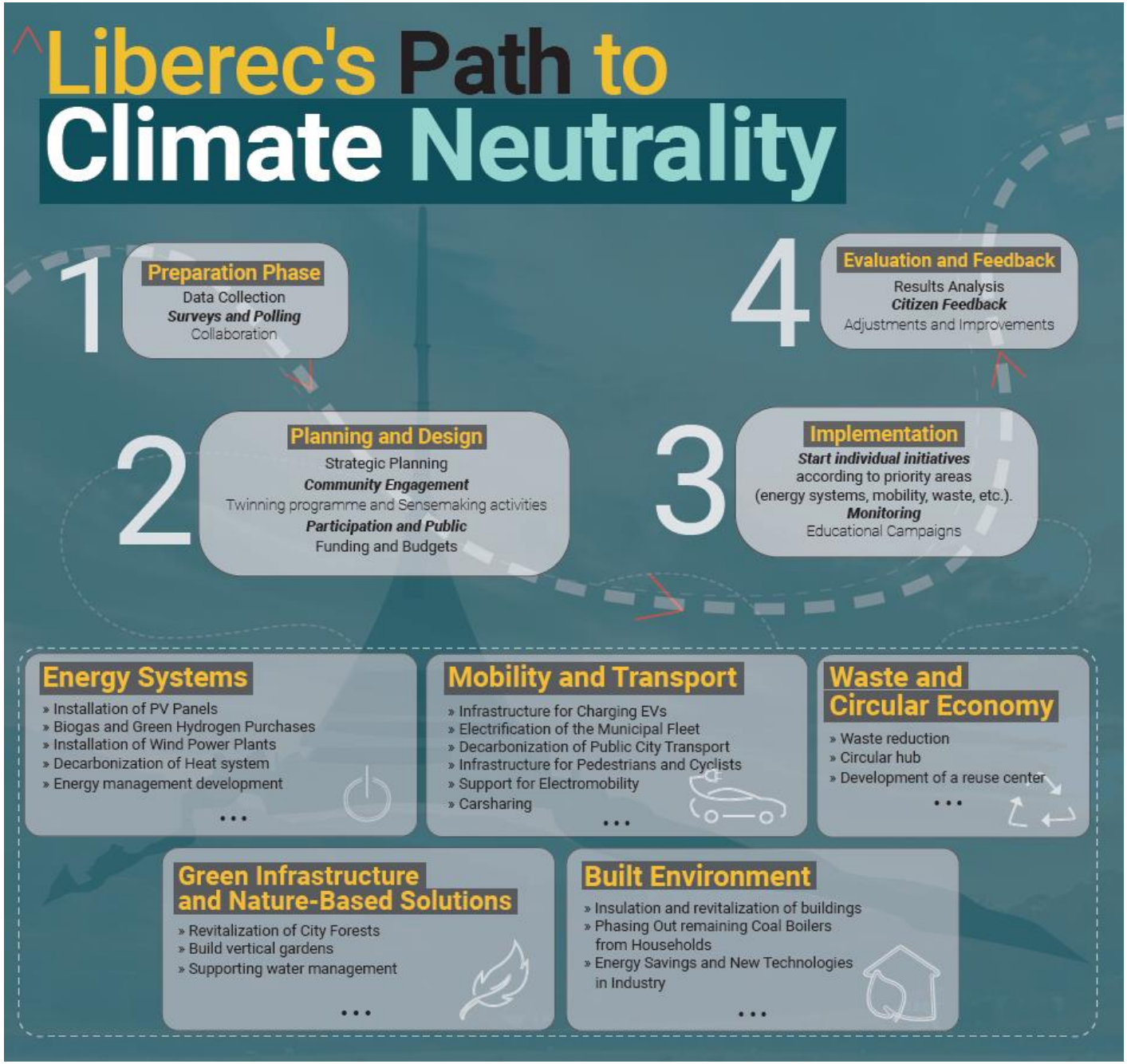
B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		timely manner, which is crucial Installation of a **controlled ventilation and heat recovery system** in the city's public buildings (schools etc.) to meet hygiene requirements. Support for the introduction of smart metering heads, assisting individuals through a single energy contact point (one-stop shop) to replace electrical appliances. **Use of cooling media with lower GWP**			
	Governance & policy				
	Social innovation	Addressing energy-saving city demonstration projects that will be open to the public so that the public can learn about these projects.	Confidence and knowledge of the wider public in complex renovations and energy savings. Knowledge built on experience and direct site visits.		
	Democracy/par-ticipation	Involve citizens in the urban planning and development process through public consultations, workshops, and online platforms to gather input and build consensus.			

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
	Finance & funding	**Utilisation of EPC**, which is a great opportunity for the city how to fund energy upgrades from cost reduction (guaranteed energy savings) and first occasion of „creative financing“ for Liberec. **Financial support** on regional, national, and international levels to low emission buildings, energy savings and buildings revitalisation **Utilization of the EUCF grant** for development the investment concepts for energy savings measures in the field-built environment	Comprehensive measures on 39 municipal buildings in following years only under the energy performance contracts, the supplier credit will be complemented by relevant subsidies. New capabilities and experience in the field of private capital engagement, financial innovations, developing bankable plans, investment concepts etc.		
	Learning and capabilities				
Cross-cutting	Technology /infrastructure	**Further development (adding new functionalities) of the online platform**, which is the online space for building the community energy, raising awareness, sharing information between the city and public, among professionals, students, etc.	Raise awareness, increase knowledge about Climate change	Raised awareness and complex understanding shall lead in longer-term perspective to GHG reduction, reduced energy demand, increase in energy efficiency etc. – which shall be caused by change in behaviour in the society and should be visible across all fields of actions (public should be more opened and willing to invest into suggested measures and change their daily decision-making patterns.	Creation of new jobs Contribution to building innovation environment in the city. Enhanced citizen & communities' participation & social capacities for participation/engagement Improved access to information, awareness & behaviour change Shared vision, understanding, comprehensive knowledge related to climate change. Increase in decentralisation, multi-governance.
	Governance & policy	**Continuous negotiation with national level including various ministries leading to increase in municipal capacity, to more favourable legislative and policy environment for the CCC Action plan implementation, establishment of national cross-departmental platform supporting Czech cities with climate-neutrality ambition.** **Improvement of multi-level governance and participatory model in Liberec**	Further development of national platform, possibility of grant support to Czech cities participating on this platform, functional mutual learning, sharing best practice across Czech cities Strengthened/shared commitment, increase in		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
			municipal capacity, expertise, engagement of private capital		Improved access to information, awareness & behaviour change
	Social innovation	**New comprehensive municipal system of participation and public education including new visual brand identity/image** (the sense is to improve, enhance participatory model in Liberec, test new participatory methods, to focus on public education for all target groups including vulnerable groups of citizens, professional public and officials responsible for Climate actions management **Developed with the university, stakeholders, and organisations Youth City programmes.** Empowerment of the younger generation to take active roles in combating climate change and leading future initiatives. **Launch city-wide campaigns** using various media channels to raise awareness about climate change and promote sustainable ways and information. Utilize social media, local newspapers, and community events to disseminate information and inspire action.	Increase capacity and capability. Better informed and activated citizens, raised awareness leading to change in their decision-making patterns and **higher share of private capital** for funding specific measure (energy savings on their buildings, RES construction) Better cooperation with academia (local university) in the city Successful development of community energy		Shared vision, understanding, and comprehensive knowledge related to climate change. Also builds acceptance and a positive perception of climate action, as well as a greater will of people to take care of public and especially green spaces and build trust and community. Increase in decentralisation, multi-governance. New jobs creation Contribution to multi-level governance in the city Crucial is new way thinking about capital deployment in the city (capital planning), testing financial innovation in climate activities funding, building relationships with private sector key stakeholders and thus, engagement of private capital. Liberec as a frontrunner for other Czech cities in this field. Positive change of the overall environment and culture across the city, mainly city hall, in case of employees and officials, including
	Democracy/par-ticipation	**Further development of participatory system** in Liberec, testing new participatory methods (part of some Horizon projects that are under implementation currently) **Collaborate with NGOs and enterprises** to leverage their expertise and resources in implementing and maintaining green and	Increase in the number of citizens willing to engage in municipal processes including strategic planning and implementation of relevant projects, increase in the allocated amount for the participatory budget		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		socially responsible projects through voluntary commitments.			politicians, leads to greater openness to change, innovation, new ways of thinking, which is necessary in this field.
	Finance & funding	Hiring finance expert working in the municipal department, cooperating closely with climate specialist/coordinator and adaptation coordinator, searching for new ways and opportunities for funding climate activities **Increase in utilization of direct EU grant schemes and initiatives.** **NZC Capital Hub utilization**	New approach to capital planning of the city, enabling better deployment of capital and engagement of private capital, increase in climate activities implemented in the city. Increase in public funds in Liberec, besides, through common projects with stakeholders from private sector better relationship, involvement into municipal strategic planning and processes, and thus, engagement of private capital		Financial savings (possibility of replication of already verified solution) Increase in municipal (officials and politicians) capacity (in terms of expertise/capabilities) Increased awareness of social issues Greater resolve of the residents to implement adaptation measures. Preparedness of the residents for potential risks related to climate change.
	Learning and capabilities	Learning as a natural part of European projects/consortiums participation (Twinning programme, Boot Camp, sensemaking, learning as a part of the overall monitoring, evaluation and learning of each project Establishment of long-term system of education for officials and politicians, which will be a part of one comprehensive system of participation and education for which we create partnerships with various stakeholders engaged with public education and participatory activities. By implementing **Comprehensive Climate Education**	Increase in internal capabilities, improvement of all relevant municipal processes. Replication of successful solutions from abroad (not only as a part of twinning programme) Bigger understanding and higher capabilities, comprehensive knowledge Cities become more **capable of withstanding**		

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions till 2030)**	**Indirect impacts (cobenefits)**
		Program, the city can foster a culture of environmental responsibility and drive meaningful progress towards sustainability and climate resilience. All these will lead to improving and implementing **comprehensive (regular actualization) risk management measures**, emphasizing technology, smart city solutions, and community engagement in planning and emergency preparedness to ensure a resilient urban environment. These efforts reduce vulnerability and protect critical infrastructure.	**and recovering from climate-related** crises, minimizing disruptions to daily life and economic activities and lower the risk of infrastructure damage. **Public education** in relation to the implementation of adaptation measures - green roofs, methodological guidance, retention basins, etc.		



Picture visualizes the city's path to climate neutrality by 2030, there are specific pathways, measures and also the overall process of transition.

This picture can be helpful in communicating the approach to wide public.

B-1.2: Description of impact pathways

The suggested pathways are the result of a co-creation process with continual input. The foundation lies in the city's current strategic documents and action plans, which outline the overall vision and measures. Additionally, hard data from the emission inventory was complemented by feedback gathered through participatory/co-creation activities such as roundtables, brainstorming with key stakeholders, and civic forums. External advisory support also played a role, with a consultancy providing impact calculations and estimations for various measures and actions, based on data and input from the city and key stakeholders. We also utilized the NZC check, which provided valuable feedback.

Suggested pathways are in line with strategic priorities stated in the Commitments.

In the table above, specific pathways for all fields of action are described, including systemic levers, early changes, late outcomes, direct impacts, and co-benefits. Direct impacts were calculated for the outcomes in the fields of mobility and transport, as well as the built environment (which also incorporates some outcomes from the fields of energy and waste). All actions aligned with these suggested pathways are outlined below but in general, the aim is :

- Transformation of local **energy** market, based on the RES (importance of RES construction, solar and wind power plants, biogas station construction), on decarbonisation of local heating system, development of community energy, importance of increase in capacity and financial resources for the actions implementation, strengthening cooperation and mutual learning with key stakeholders.
- Development of low-emission and zero-emission **transport**, focus on electrification of private and public transport, active mobility, construction of appropriate infrastructure and services, connected with public space re-design.
- Public education and various programmes in the field of **waste and circular economy**, which should be based on recycling and re-use and high-quality municipal waste management
- High-quality maintenance of **green spaces** including forests planting on the cadastral area of the city, planting new greenery, appropriate water management
- In the field of **built environment** to be focused on ongoing buildings' refurbishment, modernisation of lighting, appropriate energy management and successful implementation of EPC projects.
- Long-term, sustainable system of education, cooperation, participation, and facilitation that involves all key stakeholders.

In conclusion, suggested pathways are fully in line with current state analysis of climate action and in line with Liberec 2030 Climate Neutrality Commitments, including both strategic priorities and stakeholders involved.

3.2 Module B-2 Climate Neutrality Portfolio Design

Module B-2 “Climate Neutrality Portfolio Design” contains a project description for **each action planned** in the CCC Action Plan. This includes interventions targeted at creating/enhancing carbon sinks to address residual emissions.

B-2.1: Description of action portfolios		
Fields of action	Portfolio description	
	List of actions	Descriptions
Energy systems	Installation of PV panels on roofs of municipal buildings and buildings owned by the region	Installation of approximately 2.15 MWp of PV panels on roofs of municipal and regional buildings
	Installation of PV panels on roofs of industrial and commercial buildings	The measure involves construction of 2.5 MWp rooftop PVs on industrial buildings and 0.8 MWp on commercial buildings
	Installation of PV panels on roofs of residential buildings	Installation of 2.95 MWp of rooftop PVs on residential buildings.
	Installation of large PV power plants	Construction of a 9 MWp photovoltaic power plant on the site of a former landfill within the city. Construction of up to 170 MWp PV plants outside the city territory
	Biogas and green hydrogen purchases	Replacement of up to 550 GWh of natural gas
	Installation of wind power plants	Construction of three wind power plants of total capacity 16 MW within the city territory and other 160 - 220 MW outside the city territory
	Decarbonisation of heat production and distribution	This measure involves actions planned by the Teplárna (heating plant) Liberec – PV plant on the roof, new biogas plant for replacement of natural gas, unit for refining biofuels of 2nd generation + cogeneration unit, revitalisation of distribution network
Mobility & transport	Infrastructure built for charging private and commercial EVs in the city	Building publicly available chargers for EVs.
	Infrastructure for charging city buses built by the Teplárna Liberec	Construction of a repair pit with high-capacity charges for electric buses of the public city transport
	Electrification of municipal and regional fleet	Replacement of cars owned by the municipality/region and municipal/regional organisations by Evs including charging infrastructure in the city
	Decarbonisation of the public city transport	Replacement of diesel buses with electric or biogas buses, modernisation of the tram transport
	Infrastructure for pedestrians and bikers	Building safe and comfortable ways for walking and biking
	Support to freight electromobility	Building infrastructure enabling electric intracity freight transport.
Waste & circular economy	Higher level of municipal wastes sorting	Better utilisation of secondary raw materials from the municipal waste
Green infrastructure & nature-based solutions	Revitalisation of city forests after bark beetle calamity	Planting more resilient tree species in clearings after logging in areas affected by bark beetles

Built environment	Insulation and revitalisation of municipal and regional buildings	Various levels of revitalisation of municipal/regional buildings and buildings of municipal/regional organisations in the city
	Insulation and revitalisation of residential buildings	Various levels of revitalisation of residential buildings
	Insulation and revitalisation of commercial buildings	Various levels of revitalisation of commercial buildings
	Phasing out remaining coal boilers from households	Replacement of coal boilers in households by natural gas, electric boilers, or heat pumps.
	Energy savings and new technologies in industry	Energy saving measures and phasing out fossil fuels in industry.
Cross-cutting	Establishment of comprehensive system of public education, awareness-raising, facilitation, and participation	Activities leading to activization of public, raising awareness, increased knowledge, understanding, commonly shared vision and strengthening the transition team in Liberec.

B-2.2.1: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Installation of PV panels on roofs of municipal buildings and buildings owned by the region**
	Action type	Investment into renewable energy sources
	Action description	Installation of approximately 2.15 MWp of PV panels on roofs of municipal buildings. This measure is a precondition for successful community energy development and ensuring secure, self-sufficient, and independent local energy market. In 2022 – 2023, there was analysed municipal buildings' potential for PV panels installation and relevant finance available (subsidies). This measure was prepared in close preparation of the EPC projects. In 2024, there will be installed first PV panels on ten municipal buildings, in 2026 there will be installed PV panels on other ten buildings and as a part of EPC projects – in 2025 – 2026 on other ten buildings will be installed PV panels. Furthermore, Regional office plans to install PV panels on three regional buildings.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	PV panels on roofs of municipal buildings
Implementation	Responsible bodies/person for implementation	Municipality (Energy department – energy strategic planning/mapping of municipal buildings potential; Municipal Property Management department – technical service and management; Department of Strategic Development and Subsidies - funding, municipal organisations, Regional Office of the Liberec region, regional organisations
	Action scale & addressed entities	This measure can be quickly realised, the implementation has already started, the measure has a high priority at the city level

	Involved stakeholders	Municipality, municipal organisations, companies responsible for construction, subsidy provider, electric power distributor
	Comments on implementation – consider mentioning resources, timelines, milestones	Timeline 3 – 5 years. Till 2026, there are thirty municipal buildings prepared for PV panels construction (under community energy project and EPC), the Liberec region plans to install PV panels on three buildings (elementary school established by the region, high school, and regional office) Subsidies available from OP Environment and Modernisation fund
Impact & cost	Generated renewable energy (if applicable)	2,154 MWh
	Removed/substituted energy, volume, or fuel type	Electricity from the public grid
	GHG emissions reduction estimate (total) per emission source sector	1,022 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	3.04 Mio € 2,971 €/t CO_2eq

B-2.2.2: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Installation of PV panels on roofs of industrial and commercial buildings**
	Action type	Investment into renewable energy sources
	Action description	The measure involves construction of 2.5 MWp rooftop PVs on industrial buildings and 0.8 MWp on commercial buildings. Private entities are motivated to RES construction via community energy concept (for the role of producer or prosumer) that will be promoted intensively since 3Q 2024 in the city.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	PV panels on roofs of industrial and commercial buildings
Implementation	Responsible bodies/person for implementation	Owners of commercial and industrial buildings, municipality
	Action scale & addressed entities	This measure can be quickly implemented – the implementation has already started (owners of those buildings want to use the opportunity of subsidy funding available, the only burden for the implementation can be insufficient capacity of the distribution network)
	Involved stakeholders	Owners of commercial and industrial buildings, municipality, subsidy provider, electricity power distributor
	Comments on implementation – consider mentioning resources, timelines, milestones	The role of municipality is to minimize possible administrative obstacles and enhance awareness of possible subsidies

Impact & cost	Generated renewable energy (if applicable)	3,300 MWh
	Removed/substituted energy, volume, or fuel type	Electricity from the public grid
	GHG emissions reduction estimate (total) per emission source sector	1,566 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	4.16 Mio € 2,657, €/t CO_2eq

B-2.2.3: Individual action outlines		
Action outline	Action name	**Installation of PV panels on roofs of residential buildings**
	Action type	Investment into renewable energy sources
	Action description	Installation of 2.95 MWp of rooftop PVs on residential buildings. Successful implementation of this measure is a precondition for the community energy development (for the role of producer or prosumer), which can motivate citizens, together with current subsidy system for RES construction and buildings' refurbishment (maximisation of the actions' efficiency on buildings), supported by the assistance from the community energy service and management organisation.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	PV panels on roofs of residential buildings
Implementation	Responsible bodies/person for implementation	Households
	Action scale & addressed entities	This measure can be quickly realised (implementation has already started, individuals and households want to use the opportunity of ongoing subsidy programme). Besides, there will be launched campaign for public to activate households and individuals to join the energy community, furthermore, there will be strong activisation via appropriate educational/participatory system of the city.
	Involved stakeholders	Households, municipality, community energy service and management organisation, companies delivering the technology solution, electric power distributor
	Comments on implementation – consider mentioning resources, timelines, milestones	Maximal utilisation of subsidies from the New Green Savings Scheme
Impact & cost	Generated renewable energy (if applicable)	2,950 MWh
	Removed/substituted energy, volume, or fuel type	Electricity from the public grid

	GHG emissions reduction estimate (total) per emission source sector	1,400 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	4.72 Mio € 3,372, €/t CO_2eq

B-2.2.4: Individual action outlines		
Action outline	Action name	**Installation of large PV power plants**
	Action type	Investment into renewable energy sources
	Action description	City has already mapped potential of some localities in the city, there are three possible areas, two of them are former landfills, for one those possible power plants, simplified business model has been already developed (great potential for private investors, construction in 2027), this power plant would be source of energy for trams in the city, other part of energy would be delivered to the enterprises in the surroundings (PPA). Other actually considered project is also former landfill and it would be distributed via standard electric power transmission system. Third considered locality would be (because of the land bonification) appropriate for agrofotovoltaics (idea of agrofotovoltaics on pylons – connected with water management activity (retention ponds/tanks). Most of PV plants would be constructed outside the city territory.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Large PV plants
Implementation	Responsible bodies/person for implementation	Municipality
	Action scale & addressed entities	It is a large measure. The construction will involve also territory outside the city, there will be necessary
	Involved stakeholders	Municipality, electric power distributor (capacity), electricity consumers, DMPLJ, companies responsible for technology solutions, private investors, subsidy providers
	Comments on implementation – consider mentioning resources, timelines, milestones	The PV plants construction will span over the whole period till 2030. There are already considered three areas for PV plants construction in Liberec. Relevant comments above. Funding from the Modernisation fund is envisaged.
Impact & cost	Generated renewable energy (if applicable)	179,120 MWh

	Removed/substituted energy, volume, or fuel type	Electricity from the public grid
	GHG emissions reduction estimate (total) per emission source sector	84,994 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	175 Mio € 2,057 €/t CO_2eq

B-2.2.5: Individual action outlines		
Action outline	Action name	**Biogas and green hydrogen purchases**
	Action type	Purchase of green certificates of biogas and purchase of green hydrogen for injecting into the natural gas grid
	Action description	Replacement of up to 550 GWh of natural gas
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Gradual replacement of natural gas with biogas and hydrogen
Implementation	Responsible bodies/person for implementation	Private entities, municipality (possibly)
	Action scale & addressed entities	It is difficult to obtain a big amount of biogas, we can see potential consumption by the public transport provider, furthermore, industry enterprises are interested in biogas as well, since many entities face struggles with replacement of natural gas. This measure needs to be developed in a more detail yet, problematic is low efficiency of hydrogen production and still high prices of appropriate technology (price of green hydrogen)
	Involved stakeholders	Municipality, natural gas distributors, private enterprises
	Comments on implementation – consider mentioning resources, timelines, milestones	This measure does not involve substantial investment costs, however payments for energy will increase.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	619,000 MWh of natural gas
	GHG emissions reduction estimate (total) per emission source sector	124,794 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	Only operational costs 6,478 €/t CO2eq.year

B-2.2.6: Individual action outlines		
Action outline	Action name	**Installation of wind power plants**
	Action type	Investment into renewable energy sources
	Action description	Construction of three wind power plants of total capacity 16 MW within the city territory and other 160 - 220 MW outside the city territory. We are aware that this measure needs to be communicated with public very carefully to get their understanding and positive perception of wind power plants construction (we already consider specific participation methods for work with citizens in this field). Other barrier for implementation is sufficient funding, it is crucial to find partners from private sector. Also there might be some burdens given by spatial conditions of the city.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Constructed wind power plants
Implementation	Responsible bodies/person for implementation	Municipality
	Action scale & addressed entities	It is a large measure, which has a high priority in terms of reaching the overall goal (solar power needs to be complemented by wind power, which has a great potential in Liberec, based on basic wind map). The construction will involve also territory outside the city.
	Involved stakeholders	Municipality, private investors, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	The wind power plants construction will span over the whole period till 2030. Currently, we need to develop more detailed wind map for the city (we have some basic mapping, which is not sufficient for further project development). The project proposal concept for wind power plants in Liberec was approved by municipal deputy mayors in 8/2024. Funding from the Modernisation fund is envisaged.
Impact & cost	Generated renewable energy (if applicable)	590,000 MWh
	Removed/substituted energy, volume, or fuel type	Electricity from the public grid
	GHG emissions reduction estimate (total) per emission source sector	279,959 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	515 Mio € 1,839 €/t CO_2eq

B-2.2.7: Individual action outlines		
Action outline	Action name	**Decarbonisation of heat production and distribution**
	Action type	Investment into complex decarbonisation of district heat production
	Action description	This measure involves actions planned by the Teplárna (heating plant) Liberec, which are PV plant on the roof, new biogas plant for replacement of natural gas, unit for refining biofuels of 2nd generation + cogeneration unit, revitalisation of distribution network
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Decarbonisation of heating system, testing new solutions in Liberec
Implementation	Responsible bodies/person for implementation	Teplárna (Heating Company) Liberec
	Action scale & addressed entities	Emission factor of district heat for all consumers will decrease.
	Involved stakeholders	Teplárna (Heating Company) Liberec, municipality, consumers of the energy, DPMLJ
	Comments on implementation – consider mentioning resources, timelines, milestones	The measure involves several actions spanning the whole period till 2030. Utilisation of subsidies from the Modernisation Fund is envisaged.
Impact & cost	Generated renewable energy (if applicable)	29,310 MWh
	Removed/substituted energy, volume, or fuel type	Electricity from the public grid Natural gas savings
	GHG emissions reduction estimate (total) per emission source sector	34,525 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	75.8 Mio € 2,196 €/t CO_2eq

B-2.2.8: Individual action outlines		
Action outline	Action name	**Infrastructure built for charging private and commercial EVs**
	Action type	Investment into transport infrastructure
	Action description	Building publicly available chargers for EVs. Great investment is also concerned with costs for necessary reinforcement and reconstruction of the distribution network in the city, there will be installed high-capacity charging points that will be installed (financed) mainly by energy distributors and private actors, also some low-capacity charging points funded by the city resources (for example in housing estates)
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/infrastructure

	Outcome (according to module B-1.1)	Building infrastructure for charging of EVs
Implementation	Responsible bodies/person for implementation	Municipality, Energy distributors, private actors (from business sector, petrol stations, department stores etc.)
	Action scale & addressed entities	Continuous long-term measure Households and private sector
	Involved stakeholders	Electricity distribution company, private sector
	Comments on implementation – consider mentioning resources, timelines, milestones	Gradual increasing number of both low- and high-capacity charging points using available subsidy options
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Substitution of gasoline and diesel fuel with electricity from RES
	GHG emissions reduction estimate (total) per emission source sector	5,895 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	76.2 Mio € 12,926 €/ t CO_2eq

B-2.2.9: Individual action outlines		
Action outline	Action name	**Infrastructure for charging city buses built by the Teplárna Liberec**
	Action type	Investment into public city transport infrastructure
	Action description	Construction of a repair pit with high-capacity charges for electric buses of the public city transport
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Building infrastructure for charging of EVs
Implementation	Responsible bodies/person for implementation	Teplárna (Heating company) Liberec
	Action scale & addressed entities	Large co-operative measure leading to air quality improvement for all city inhabitants
	Involved stakeholders	Municipality Teplárna Liberec DPMLJ (Public Transport Company of Cities Liberec and Jablonec)
	Comments on implementation – consider mentioning resources, timelines, milestones	Utilisation of existing and newly built energy infrastructure and adjacent free area of Teplárna Liberec to charge and maintain city buses
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Substitution of diesel fuel and CNG with electricity
	GHG emissions reduction estimate (total) per emission source sector	142 t CO_2eq

	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	5.6 Mio € 39,339 € /t CO_2eq

B-2.2.10: Individual action outlines		
Action outline	Action name	**Electrification of municipal and regional fleet**
	Action type	Investment into EVs purchase
	Action description	Replacement of electro-cars (50 municipal cars and 43 owned by the region), i.e. cars utilized by the municipality/region and mainly by the municipal and regional organisations (with impact on the cadastral area of the city) by Evs including charging infrastructure
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Building infrastructure for charging of EVs (including purchase of cars)
Implementation	Responsible bodies/person for implementation	Municipality, municipal organisations
	Action scale & addressed entities	Quite expensive exemplary measure.
	Involved stakeholders	Municipality, municipal organisations, Regional Office, regional organisations, subsidy providers
	Comments on implementation – consider mentioning resources, timelines, milestones	Gradual electrification of the fleet of municipality/region and its organisations Measure spanning the whole period till 2030, lower priority than measures in the field of energy.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Substitution of gasoline and diesel fuel with electricity from RES
	GHG emissions reduction estimate (total) per emission source sector	1,854 t CO_2eq (at minimum)
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	3,7 Mio € 1078,75 €/t CO_2eq

B-2.2.11: Individual action outlines		
Action outline	Action name	**Decarbonisation of the public city transport**
	Action type	Investment into electric and/or biogas buses
	Action description	Replacement of diesel buses with electric or biogas buses, modernisation of the tram transport. Tram transport has a tradition in the city, but is typical by quite high emission factor and high maintenance cost, this is why also possibility of hybrid trolleys is under consideration currently
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Development of low emission public city transport
Implementation	Responsible bodies/person for implementation	Municipality DPMLJ (Public Transport Company of Cities Liberec and Jablonec)
	Action scale & addressed entities	Mainly acquisition of approximately 60 city buses.
	Involved stakeholders	Municipality DPMLJ (Public Transport Company of Cities Liberec and Jablonec)
	Comments on implementation – consider mentioning resources, timelines, milestones	Measure spanning the whole period till 2030. Possible subsidies from the Modernisation fund
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Substitution of diesel fuel and CNG with electricity from RES and biogas
	GHG emissions reduction estimate (total) per emission source sector	1,847 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	28 Mio € 15,160 €/t CO_2eq

B-2.2.12: Individual action outlines		
Action outline	Action name	**Infrastructure for pedestrians and bikers**
	Action type	Investment into active mobility infrastructure Changes to traffic regime
	Action description	Building safe and comfortable ways for walking and biking, generally connected with public space re-design and improvement of its functionality in terms of ensuring fully, safely penetrable city, including the aesthetic function of public space.
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/infrastructure + Governance & Policy
	Outcome (according to module B-1.1)	Building safe and comfortable ways for walking and biking

Implementation	Responsible bodies/person for implementation	Municipality
	Action scale & addressed entities	Quite expensive roads and pavements adaptations and changes of the local traffic rules influencing all city inhabitants and visitors
	Involved stakeholders	Municipality, private sector (individual owners of real estate who often hinder and make the construction of cycling lanes much more expensive)
	Comments on implementation – consider mentioning resources, timelines, milestones	Measure spanning the whole period till 2030
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Absolute savings of motor fuels and electricity
	GHG emissions reduction estimate (total) per emission source sector	101 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	1.6 Mio € 15,978 €/t CO_2eq

B-2.2.13: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Support to freight electromobility**
	Action type	Investment into transport infrastructure
	Action description	Building infrastructure enabling electric intracity freight transport, which will be placed near to the heating plant Teplárna Liberec. This measure will be developed yet, this is something that needs to be discussed with industry and should be covered by the specific commitment of the city and industry, which is planned and described in this CCC AP.
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Decarbonisation of freight transport
Implementation	Responsible bodies/person for implementation	Teplárna Liberec, municipality
	Action scale & addressed entities	This measure focuses on the supply and deliveries of businesses located in the city
	Involved stakeholders	Municipality
	Comments on implementation – consider mentioning resources, timelines, milestones	The measure will span the whole period till 2030
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Substitution of diesel fuel and gasoline with electricity from RES

	GHG emissions reduction estimate (total) per emission source sector	268 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	2 Mio € 7,462.69 €/t CO_2eq

B-2.2.14: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Higher level of municipal waste sorting**
	Action type	Investments into better waste management in the city, including projects of the Regional Hospital Liberec
	Action description	Better utilisation of secondary raw materials from the municipal waste
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Lower volume of burned waste
Implementation	Responsible bodies/person for implementation	City of Liberec, Regional Hospital Liberec
	Action scale & addressed entities	Action following current focus on continuous purchase of composters for citizens, activities of the Regional Hospital decreasing the volume of disposed waste significantly and improving the waste sorting
	Involved stakeholders	Regional Hospital Liberec
	Comments on implementation – consider mentioning resources, timelines, milestones	Continuous activities by 2030, Regional Hospital's measure can be implemented within three years
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Decreased volume of waste
	GHG emissions reduction estimate (total) per emission source sector	*36* t CO_2eq (calculated impact of KNL project), probably even more, further impact is sequestrated CO_2 via composting. This action still needs to be developed more
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	6.2 Mio € *172,222* €/t CO_2eq

B-2.2.15: Individual action outlines		
Action outline	Action name	**Revitalisation of city forests after bark beetle calamity and municipal public greenery**
	Action type	Investments into reforestation
	Action description	Planting more resilient tree species in clearings after logging in areas affected by bark beetles. Improved maintenance of public greenery in the city
Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Technology /infrastructure
	Outcome (according to module B-1.1)	Revitalisation of city forests after bark beetle calamity, increase in public greenery quality (its adaptation/mitigation functionality)
Implementation	Responsible bodies/person for implementation	Městské lesy Liberec (City Forests Liberec) Lesy ČR (Forests of the Czech Republic) Municipality
	Action scale & addressed entities	About 20 ha per year of green fields will be reforested
	Involved stakeholders	Městské lesy Liberec (City Forests Liberec) Státní lesy ČR (State Forests of the Czech Republic) Municipality
	Comments on implementation – consider mentioning resources, timelines, milestones	The management of green fields in the city is subsidised by the municipality.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	-
	GHG emissions reduction estimate (total) per emission source sector	-
	GHG emissions compensated (natural or technological sinks)	The main volume of CO_2 will be captured after 2030. Currently the tree seedlings capture only negligible amount of CO_2.
	Total costs and costs by CO2e unit	1.6 Mio €

B-2.2.16: Individual action outlines		
Action outline	Action name	**Insulation and revitalisation of municipal (and regional) buildings**
	Action type	Investment into buildings revitalisation
	Action description	Various levels of revitalisation of municipal/regional buildings and buildings of municipal/regional organisations. This will be implemented in line with Energy Performance Contracting that will cover some municipal buildings. This action is connected to energy management development.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Insulation and revitalisation of buildings in all sectors

Implementation	Responsible bodies/person for implementation	Municipality Municipal organisations
	Action scale & addressed entities	This measure comprises tens of buildings requiring various levels of revitalisation.
	Involved stakeholders	Municipality Municipal organisations
	Comments on implementation – consider mentioning resources, timelines, milestones	Gradual revitalisation of buildings owned by the city will span the whole period till 2030. Use of subsidies, mainly from the Modernisation fund, is envisaged
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Decreased consumption by 28 GWh (natural gas, district heat and electricity)
	GHG emissions reduction estimate (total) per emission source sector	14,866 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	96.4 Mio € 9,880 €/t CO_2eq

B-2.2.17: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Insulation and revitalisation of residential buildings**
	Action type	Investment into buildings revitalisation
	Action description	Various levels of revitalisation of residential buildings to decrease energy consumption, households and individuals are motivated by quite high energy prices in the Czech Republic, by current subsidy programmes and initiatives available, will be motivated and activated by the municipality (raising awareness and understanding, information about all possibilities and connection to community energy development and launching the marketing campaign in 4Q 2024)
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Insulation and revitalisation of buildings in all sectors
Implementation	Responsible bodies/person for implementation	Households
	Action scale & addressed entities	This is a challenging measure to decrease energy consumption in apartment and family houses
	Involved stakeholders	Households Municipality, community energy service and management organisation, subsidy providers, NGOs (mainly in case of vulnerable groups of citizens and energy poverty issue)
	Comments on implementation – consider mentioning resources, timelines, milestones	The substantial role should play the subsidy programme New Green Scheme, Social Climate Fund. The role of the municipality is to maximally ease the administrative procedures.

Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Energy savings of 62 GWh in natural gas, district heat and electricity
	GHG emissions reduction estimate (total) per emission source sector	18,866 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	146.9 Mio € 7,785 €/t CO_2eq

B-2.2.18: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Insulation and revitalisation of commercial buildings**
	Action type	Investment into buildings revitalisation
	Action description	Various levels of revitalisation of commercial buildings, owners are motivated by high energy prices and subsidies available
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Insulation and revitalisation of buildings in all sectors
Implementation	Responsible bodies/person for implementation	Businesses
	Action scale & addressed entities	Tens of buildings requiring various levels of insulation and revitalisation
	Involved stakeholders	Businesses
	Comments on implementation – consider mentioning resources, timelines, milestones	The substantial role should play the subsidies, mainly from Operational Program Technologies and Application for Competitiveness, National Recovery Programme, Social Climate Fund and Modernisation Fund The role of the municipality is to maximally ease the administrative procedures.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Energy savings of 14.8 GWh in natural gas, district heat and electricity
	GHG emissions reduction estimate (total) per emission source sector	6,192 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	4.52 Mio € 730 €/t CO_2eq

B-2.2.19: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Phasing out remaining coal boilers from households**
	Action type	Investment into new heat sources
	Action description	Replacement of coal boilers in households by natural gas or electric boilers or heat pumps.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Switching to more climate friendly energy carriers
Implementation	Responsible bodies/person for implementation	Households
	Action scale & addressed entities	About 1,500 remaining coal boilers in family houses will be replaced with heat pumps (20 % of coal boilers) or electric, natural gas (about 40 % of coal boilers) or biomass boilers (about 40 % of coal boilers)
	Involved stakeholders	Households Municipality Subsidy providers NGOs (there can be stated that the high share of coal boilers owners have to face to energy poverty risk)
	Comments on implementation – consider mentioning resources, timelines, milestones	A special subsidy programme “Boiler subsidies” was designed for this purpose. The role of the municipality is to maximally ease the administrative procedures.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Substitution of coal with more climate friendly energy carriers in family houses
	GHG emissions reduction estimate (total) per emission source sector	12,894 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	13 Mio € 1,016 €/t CO_2eq

B-2.2.20: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Energy savings and new technologies in industry**
	Action type	Investments into technologies
	Action description	Energy saving measures and phasing out fossil fuels in industry.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	New technologies in industry
Implementation	Responsible bodies/person for implementation	Industries
	Action scale & addressed entities	Technology innovation in industry is a challenging and expensive measure.
	Involved stakeholders	Industry, subsidy providers

	Comments on implementation – consider mentioning resources, timelines, milestones	This measure will span over the whole period till 2030. The substantial role should play the subsidies, mainly from Operational Program Technologies and Application for Competitiveness, National Recovery Programme and Modernisation Fund . The role of the municipality is to maximally ease the administrative procedures.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	Switching from coal and natural gas to more climate friendly energy carriers, energy savings of all energy carriers, switch to coolants with lower GWP
	GHG emissions reduction estimate (total) per emission source sector	5,124 t CO_2eq
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	29 Mio € 5,660 €/t CO_2eq

B-2.2.21: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	**Establishment of comprehensive system of public education, awareness-raising, facilitation, and participation**
	Action type	Investments into courses, online channels, marketing and PR activities, events, communication with key stakeholders' facilitation, participation
	Action description	Establishment of above-mentioned system, which is based on cooperation with local and national stakeholders, civic society (NGOs focused on climate change). These are 'extra' activities beside environmental education that is under regional responsibility. There will be implemented various instruments for various target groups as citizens (including vulnerable groups), professional public (as energy managers), politicians, employees and officials working for the city, businesses.
Reference to impact pathway	Field of action	Cross-cutting
	Systemic lever	Governance and policy; culture, participation, and social innovation; Capacity and capability building
	Outcome (according to module B-1.1)	Increased knowledge, understanding, raised awareness, shared vision and commitment – behavioural change, specific climate commitment of industry (between municipality and industry)
Implementation	Responsible bodies/person for implementation	Municipality

	Action scale & addressed entities	Citizens (around 107 inhabitants), around 450 municipal employees, 39 city counsellors
	Involved stakeholders	Regional Development Agency, Teplárna Liberec, NGOs, subcontracted entities beyond project consortium, National Healthy Cities Network, Regional Office of the Liberec Region
	Comments on implementation – consider mentioning resources, timelines, milestones	The core of this measure is long-term system that will be spread all over city and target groups. We plan to build this measure on systemic cooperation with local actors. For the establishment we plan to apply for the Enabling City Transformation Call where suggested implementation would be based on personnel cost covered by the grant fully. City would be a lead partner of created project consortium.
Impact & cost	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume, or fuel type	-
	GHG emissions reduction estimate (total) per emission source sector	n/a
	GHG emissions compensated (natural or technological sinks)	-
	Total costs and costs by CO2e unit	0,5 Mio € (2025 – 2026)

B-2.3: Summary strategy for residual emissions

The following table shows the number of residual emissions.

	Emissions [t CO_2eq]	Percentage
Emissions in 2019	740 713	100
Emissions drop	596 345	82
Residual emissions	**133 294**	**18**

The structure of residual emissions by sectors is shown in the next table.

Sector	Residual emissions [t CO_2eq]	Percentage
Buildings	48 592	36,6
Transport	45 138	33,8
Waste	-	-
Industrial Process and Product Use (IPPU)	23 531	17,6
Agricultural, Forestry and Land Use (AFOLU)	16 069	12
Total	**133 294**	**100**

The largest share of residual emissions is from transport. These emissions are practically unavoidable for two main reasons. First, a significant portion comes from transit traffic (including a highway that passes through the city), which the city cannot eliminate. Second, it is unlikely that all car owners in the city will switch to electric or hydrogen vehicles before the end of their current cars' physical lifespan, which is typically around 18 years in the Czech Republic.

A similar share of residual emissions comes from buildings (and from energy systems due to the use of district heating). These emissions result from natural gas consumption in buildings across all sectors and district heat generation. There is not enough available biomass for biogas production, and increasing the share of hydrogen in natural gas pipelines would require technology changes and investments that are difficult to achieve within the given timeframe.

Emissions in the IPPU sector come from fluorinated gases used for production of cooling devices. The EU legislation requires use of coolants with lower GWP, but today's devices will be serviced still with the older coolants with higher GWP.

There are no significant changes in land use, so the emissions in the AFOLU sector will remain practically constant. The current afforestation of forests hit by the bark beetle will bring remarkable CO_2 sinks after some 15 – 20 years, when the new trees become big enough.

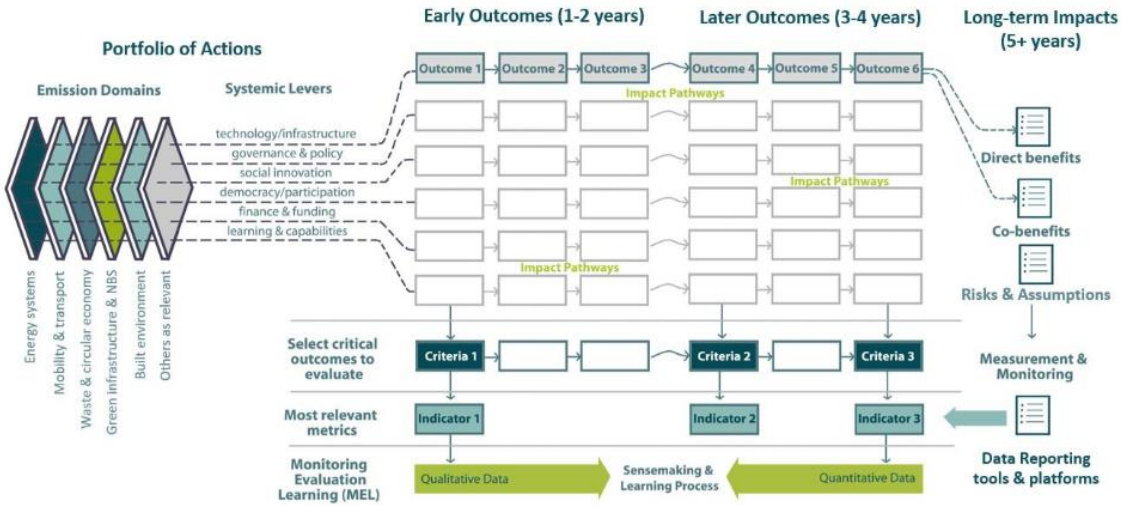
The carbonless future of the city relies on electrification and the use of green hydrogen. Since there are no viable options for significant carbon sinks within the city, we currently consider investing in corresponding CO_2 emissions reduction in other regions as an acceptable option.

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

Module B-3 “Indicators for Monitoring, Evaluation and Learning” contains a selection of indicators to monitor and evaluate progress along the selected impacts pathways and fields of action described in Module B-1. as well as a monitoring and evaluation plan, i.e., metadata on each indicator selected, in addition to milestones and timeline.

Monitoring involves the development and application of quantitative indicators to track and analyse a city's progress towards direct impacts (such as net-zero GHG emissions) and indirect impacts (co-benefits). It also includes the setup, management, and maintenance of data collection tools and infrastructure. Evaluation refers to the analysis and assessment of monitoring data against set goals, targets, and benchmarks, with the aim of determining the extent to which critical milestones, intermediate outcomes, and final impacts have been achieved. Learning is a structured and continuous process of reviewing and synthesizing information to generate real-time insights, helping cities understand which solutions are effective, in which contexts, for whom, and why. These activities generate evidence and knowledge, enabling reflexive governance and helping to correct or refine the course of action as needed.

The suggested indicator framework aligns with the impact logic presented in Picture 8, which focuses on multiple transversal levers that enable transformative change. The Portfolio of Actions generates various early and later outcomes, ultimately leading to long-term impacts, including both direct benefits and co-benefits. These causal chains form what are known as Impact Pathways.

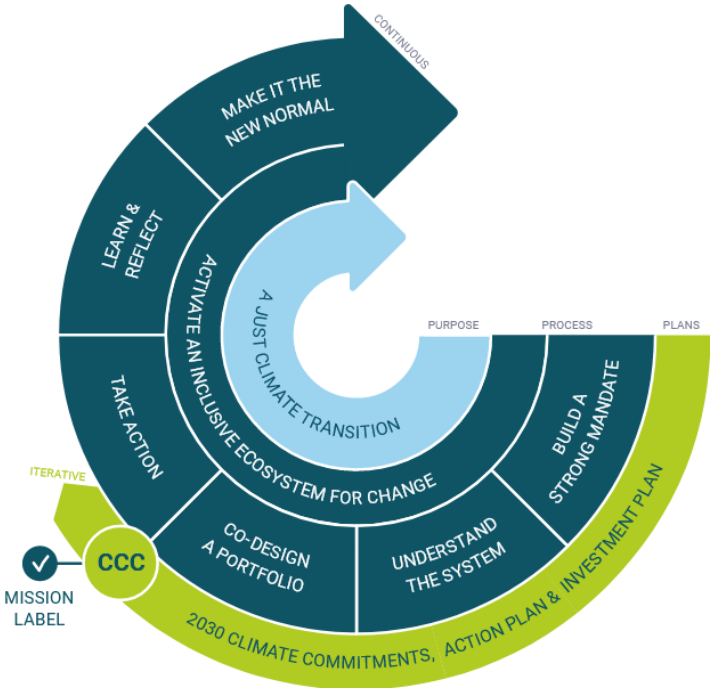


Picture 8: Impact Pathways

Source: NetZeroCities

We have selected specific critical outcomes to be evaluated using both qualitative and quantitative indicators. The overall aim is to regularly monitor and evaluate outcomes based on set milestones,

enabling a process of sensemaking and learning. This approach follows the logic of the transition map, where a crucial milestone is to learn and reflect—to update, amend, or change the pathways accordingly, or to make them the new normal. Monitoring and evaluation (both mid-term and ex-post) are essential, and based on these findings, we can learn and adjust our approach. For this reason, we have established appropriate indicators aligned with the suggested measures (pathways) described below. The climate coordinator holds primary responsibility for this process, but it also requires the involvement of the entire transition team, particularly when it comes to learning and revising the pathways.



Picture 9: Transition Map

Source: NetZeroCities

For the next steps and continued development, it will be crucial to learn from and reflect on previous achievements and to share insights across the transition team. The cooperation of the entire team is essential for compiling data (monitoring and evaluation), as the project portfolio extends beyond just municipal property. The first target values for evaluation are set for 2026, marking the first milestone, followed by 2028 and 2030 as key target years. These milestones offer the opportunity to revise the City Climate Contract, Action Plan, and Investment Plan. It is clear that new possibilities and stakeholders (as co-signatories) will emerge throughout our work. Additionally, based on regular mid-term evaluations, we will be able to revise the Action Plan portfolio and adjust goals and pathways as needed to achieve climate neutrality.

Mid-term evaluation and revise of the portfolio will help with sensemaking across the city and will specify the range of public education and adapt decision-making in the city. In the end it should ensure the

implementation more resilient and impactful. The mission coordinator has the main responsibility for ensuring/coordination of the MEL activities in the city, for collecting the data from municipal resources, then there are some data, which need to be collected/calculated by the external consultants. Each biannual evaluation will be discussed within the transition team, focusing on potential or necessary amendments and updates to all relevant documents. In addition to regular evaluations, occasional changes may occur, such as the inclusion of new stakeholders or co-signatories. All evaluations will be presented to city counsellors, as the city council holds the final decision-making power to approve any amendments. The city board, headed by the deputy responsible for this field, bears the primary responsibility for implementation. Evaluations based on the established indicators will first be reviewed by the transition team and the Commission for Climate-Neutral City, and then submitted to the city council with appropriate recommendations for revisions, amendments, or changes to be approved. This process will involve three monitoring periods: 2024 – 2026, 2027 – 2028, 2029 – 2030.

When selecting the indicators, there had to be taken into account following questions:

- What do we want to achieve? What are specific objectives and what are expected results given the suggested measures/actions?
- the overall relevance compared to the difficulty to collect such data (in terms of money and time), what the suggested indicator measures: direct/indirect benefits, indicators' availability, synergies/complementarities with other projects (saving finance and time for collecting the data) etc.

In In the table below, we outline our indicator framework, linked to the action plan portfolio and the scope of our commitment. Typically, a two-year data collection interval is suggested, but for some indicators, a four-year interval is more appropriate. While certain data can be collected, calculated, or estimated in-house, for GHG emissions (across various sectors), cities must hire external consultants. This is a significant barrier for all Czech cities, including Liberec, when it comes to strategic planning and MEL (Monitoring, Evaluation, and Learning), as there is a notable lack of available data compared to other European cities. This issue needs to be addressed at the national level, as Czech cities require support in data collection. Hiring external consultants every two years for GHG inventory updates is costly. Such support should ideally come from a newly established national platform for future climate-neutral Czech cities. If this support is made available, we will be able to revise the data collection interval accordingly.

Early changes/ late outcomes and impacts to be evaluated by indicator)	Actions from CCC AP	Unique identifier	Indicator name	Value per indicator in 2026	Value per indicator in 2028	Value per indicator in 2030
All impacts in Energy systems	All measures in Energy systems	1	GHG emission from stationary Energy	489,235	214,846	50,212
All impacts in Energy systems	All impacts in Energy systems	14	GHG emission from grid supplied energy	215 867	108 872	0
All impacts in AFOLU	All measures in AFOLU	13	Negative emissions through natural sinks	636,2	636,2	636,2
All impacts in Mobility & transport	All measures in Mobility & transport	3	GHG emission from transport	83,511	64,670	53,365
All impacts in IPPU	All measures in IPPU	5	GHG emission from IPPU	27,558	25,544	23,531
All impacts in AFOLU	All measures in AFOLU	6	GHG emission from AFOLU	16,069	16,069	16,069
PV panels on roofs of municipal buildings	Installation of PV panels on roofs of municipal buildings	5	Local RES energy production – municipal buildings	1,371	1,762	2,154
PV panels on roofs of living and commercial buildings	Installation of PV panels on roofs of industrial and commercial buildings Installation of PV panels on roofs of living buildings	6	Local RES energy production – other buildings	5,766	6,903	8,039
Large PV plants, wind plants	Installation of large PV power plants Installation of wind power plants	8	Local RES energy production – large PV plants (not on buildings) and wind plants	153,824	538,384	769,120
Phasing out coal boilers in households	Phasing out remaining coal boilers from households	8	Coal use by fuel/energy type within city boundary – coal in households	15,630	7,815	0
Gradual replacement of natural gas with electricity,	Installation of PV panels on roofs of municipal buildings	2	Energy use by fuel/energy type within city boundary – natural gas	552,218	271,597	103,225

Early changes/ late outcomes and impacts to be evaluated by indicator)	Actions from CCC AP	Unique identifier	Indicator name	Value per indicator in 2026	Value per indicator in 2028	Value per indicator in 2030
biogas, and hydrogen	Installation of PV panels on roofs of industrial and commercial buildings Installation of PV panels on roofs of living buildings Installation of large PV power plants Biogas and green hydrogen purchases Installation of wind power plants Decarbonisation of heat production and distribution Insulation and revitalisation of municipal buildings Insulation and revitalisation of living buildings Insulation and revitalisation of commercial buildings Energy savings and new technologies in industry					
Building infrastructure for charging of EVs	Infrastructure built by the municipality for charging private and commercial Evs.	10	Fuel consumption for in-boundary transportation	108,358	87,176	74,467

Early changes/ late outcomes and impacts to be evaluated by indicator)	Actions from CCC AP	Unique identifier	Indicator name	Value per indicator in 2026	Value per indicator in 2028	Value per indicator in 2030
Building safe and comfortable ways for walking and biking Municipal carsharing Decarbonisation of freight transport Raising awareness about sustainable mobility, which is accepted and supported by public/society Financial support on regional, national, and international levels to low emission vehicles and charging, biogas, and hydrogen infrastructure	Infrastructure for charging city buses built by the Teplárna Liberec Electrification of municipal fleet Infrastructure for pedestrians and bikers Support to fright electromobility		per fuel type - gasoline			
Building infrastructure for charging of EVs Development of low emission public city transport Building safe and comfortable ways for walking and biking Municipal carsharing	Infrastructure built by the municipality for charging private and commercial Evs. Infrastructure for charging city buses built by the Teplárna Liberec Electrification of municipal fleet Decarbonisation of the public city transport	4	Fuel consumption for in-boundary transportation per fuel type - diesel	176,347	136,402	112,435

Early changes/ late outcomes and impacts to be evaluated by indicator)	Actions from CCC AP	Unique identifier	Indicator name	Value per indicator in 2026	Value per indicator in 2028	Value per indicator in 2030
Decarbonisation of freight transport Raising awareness about sustainable mobility, which is accepted and supported by public/society Financial support on regional, national, and international levels to low emission vehicles and charging, biogas, and hydrogen infrastructure	Infrastructure for pedestrians and bikers Support to fright electromobility					
Improved air quality	Infrastructure built by the municipality for charging private and commercial Evs. Infrastructure for charging city buses built by the Teplárna Liberec Electrification of municipal fleet Decarbonisation of the public city transport Infrastructure for pedestrians and bikers Support to fright electromobility Phasing out remaining coal	7	PM2.5 concentration levels	57	40	30

Early changes/ late outcomes and impacts to be evaluated by indicator)	Actions from CCC AP	Unique identifier	Indicator name	Value per indicator in 2026	Value per indicator in 2028	Value per indicator in 2030
	boilers from households					
All Fields of action	All measures	9	Wellbeing of citizens (questionnaire)	TBD	TBD	TBD
Development of safe infrastructure for pedestrians and bikers	Infrastructure for pedestrians and bikers	10	Road Deaths	TBD	TBD	TBD
All Fields of action	All projects	11	Public Capital Invested in Climate Action Projects	322 M€	368 M€	230 M€
All Fields of action	All projects	12	Citizen involvement in co-creation/co-design of climate neutrality actions (number of citizens engaged in various public events or working groups	TBD	TBD	TBD

B-3.2.1: Indicator Metadata	
(For each indicator selected)	
Indicator Name	GHG emission from stationary Energy
Indicator Unit	t CO_2eq
Definition	Greenhouse gas emissions (mainly CO_2 emissions) from the operations of buildings. (This is a simplified definition. The sources below include the layered approach to calculating this indicator.)
Calculation	Base emission information can be derived through "Amount of fuel consumption per fuel type x GHG emission per fuel type". Calculation methodology has been described in detail in GHG Protocol for Cities (GPC) pages 60 – 73.
Indicator Context	Operation of buildings is the dominant GHG source in the city territory.

Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Built environment
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	• Energy consumptions by sectors and energy carriers • Emission factors
Expected data. source	• Municipality • Czech Hydrometeorological Institute • Electricity and natural gas distributors • Energy Regulatory Authority • Teplárna Liberec (Heating company) • Termizo, a. s. (Waste to energy plant)
Is the data source local or regional/national?	All
Expected availability	Yearly on demand
Suggested collection interval	4 years
References	•
Deliverables describing the indicator	GHG Protocol for Cities (2020) Also informed by: IPCC (2006, 2019), NZC Info Kit for cities(European Commission 2021b)"
Other indicator systems using this indicator.	NetZeroCities Comprehensive Indicator Framework, GHG Protocol, ISO 14064, Reference Framework for Sustainable Cities

B-3.2.2: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Energy use by fuel/energy type within city boundary
Indicator Unit	MWh/year
Definition	"Real consumption data for each fuel type disaggregated by sub-sector. This can be calculated through multiple methods. Base emission information can be derived through ""Amount of fuel consumption by fuel type per sector x GHG emission per fuel type“„. Where data is only available for a few of the total number of fuel suppliers, determine the population (or other indicators such as industrial output, floor space, etc.) served by real data to scale-up the partial data for total city-wide consumption."
Calculation	Calculation formulae for stationary energy from GHG Protocol for Cities (GPC) pages 60 – 73.
Indicator Context	Energy consumption in buildings is the driving variable of GHG emissions in this sector
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No

If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Energy savings
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	• Energy consumptions by sectors and energy carriers
Expected data source	• Municipality • Czech Hydrometeorological Institute • Electricity and natural gas distributors • Energy Regulatory Authority • Teplárna Liberec (Heating company) • Termizo, a. s. (Waste to energy plant)
Is the data source local or regional/national?	All
Expected availability	Yearly on demand
Suggested collection interval	2 years
References	
Deliverables describing the indicator	"GHG ProtoGHG Protocol for Cities (2020) Also Informed by • IPCC (2006, 2019) CCC Action plan A-1.1col for Cities (GPC)"
Other indicator systems using this indicator	

B-3.2.3: Indicator Metadata	
(For each indicator selected)	
Indicator Name	GHG emission from transport
Indicator Unit	t CO_2eq
Definition	Greenhouse gas emissions from the operations of vehicles.
Calculation	Calculation formulae for Transport indicators can be found in the GHG Protocol for Cities (2020). Deriving energy consumptions requires modelling of mobility of persons and frights within the city territory.
Indicator Context	This indicator monitors the second most important source of GHG emissions in the city.
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Mobility & transport
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes

Data requirements	• Person-kilometres and ton-kilometres by individual transport modes • Specific energy consumptions for typical vehicles of each transport mode • Emission factors of energy carriers
Expected data source	• Nationwide Traffic Census (ŘSD – Directorate of Roads and Highways) • Own modelling • DMLJ (Transport Company of Cities Liberec and Jablonec)
Is the data source local or regional/national?	Local and national
Expected availability	Once each 5 years depending on interval of the Nationwide Traffic Census
Suggested collection interval	2 years (depends on the Nationwide Traffic Census)
References	
Deliverables describing the indicator	GHG Protocol for Cities (2020), Pp. 75-87
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework, GHG Protocol, ISO 14064, Reference Framework for Sustainable Cities

B-3.2.4: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Fuel consumption for in-boundary transportation per fuel type
Indicator Unit	MWh/year
Definition	Consumption of individual energy carriers due to the operation of vehicles
Calculation	Calculation formulae for Transport indicators from GHG Protocol for Cities (GPC) pages 75 to 87
Indicator Context	Energy consumption in transport is the driving variable of GHG emissions in this sector
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Energy savings
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	• Person-kilometres and ton-kilometres by individual transport modes • Specific energy consumptions for typical vehicles of each transport mode
Expected data source	• Nationwide Traffic Census (ŘSD – Directorate of Roads and Highways) • Own modelling • DMMLJ (Transport Company of Cities Liberec and Jablonec)
Is the data source local or regional/national?	Local and national

Expected availability	Once each 5 years depending on interval of the Nationwide Traffic Census
Suggested collection interval	2 years
References	
Deliverables describing the indicator	GHG Protocol for Cities (2020), Pp. 75-87
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework

B-3.2.5: Indicator Metadata	
(For each indicator selected)	
Indicator Name	GHG emission from IPPU
Indicator Unit	t CO_2eq
Definition	Greenhouse gas emissions from industrial processes and product use within city boundary
Calculation	GHG emission calculation methodology for the IPPU sector is described in detail in the 2014 IPCC Mitigation of Climate Change, chapter 10, page 746. City-level calculation and scoping methodology described in GPC; pages 109 onward.
Indicator Context	This indicator monitors emissions of fluorinated gases used in production of cooling devices in the city
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	IPPU
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Built environment
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	Emissions of fluorinated gases
Expected data source	Czech Hydrometeorological Institute
Is the data source local or regional/national?	National
Expected availability	Once a year
Suggested collection interval	4 years
References	
Deliverables describing the indicator	"IPCC (2006, 2019) Also informed by: • GHG Protocol for Cities (2020) , JRC Infokit for Cities (European Commission 2021b)"
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework, GHG Protocol, ISO 14064, Reference Framework for Sustainable Cities

B-3.2.6: Indicator Metadata	
(For each indicator selected)	
Indicator Name	GHG emission from AFOLU
Indicator Unit	t CO_2eq

Definition	IPCC guidelines divide AFOLU emission activities into three categories: Livestock, Land, Aggregate sources, and non-CO_2 emissions sources on land. The cumulative of these emissions forms the sectoral emissions. It requires identifying which categories of the AFOLU sector are relevant for reporting purposes. Cities should keep in mind that when a source/sink of emissions is included in the CCC Action Plan (either for emissions reduction or emissions compensation) both positive and negative emissions should be accounted for and monitored.
Calculation	Detailed calculation and scoping methodology described in GPC pages 121- 137
Indicator Context	This indicator is intended for monitoring CO_2 sinks in the city forests
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Green infrastructure & nature-based solutions
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	• Changes in land use • Reforested area
Expected data source	• Municipality • Municipal Forests Liberec • Forests of the Czech Republic
Is the data source local or regional/national?	Local, regional
Expected availability	On demand
Suggested collection interval	2 years
References	•
Deliverables describing the indicator	GHG Protocol for Cities (2020) Also informed by: • IPCC (2006, 2019), JRC Infokit for Cities (European Commission 2021b)
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework, GHG Protocol, ISO 14064, Reference Framework for Sustainable Cities

B-3.2.7: Indicator Metadata	
(For each indicator selected)	
Indicator Name	PM2.5 concentration levels
Indicator Unit	µg/m^3
Definition	This indicator corresponds to the highest annual mean of PM2.5 concentration recorded in a particular year at stations in urban and suburban background locations.
Calculation	This indicator corresponds to the highest annual mean of PM2.5 concentration recorded in a particular year at stations in urban and suburban background locations. Data can be obtained: • From air quality monitoring reports in different stations on a municipal or regional level and • Based on measurements made in urban and suburban background locations established for this purpose. When a city is not able to report this value due to the non-existence of monitoring stations within city boundaries, they may report PM2.5 values from the closest regional/national station where concentration values are available.
Indicator Context	PM2,5 emissions represent one of the most important health risks. They stem from transport and operation of buildings
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Air quality
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	• Mobility & transport • Built environment
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	Annual averages from PM2,5 concentration measurements
Expected data source	Czech Hydrometeorological Institute
Is the data source local or regional/national?	National
Expected availability	Once a year
Suggested collection interval	2 years
References	
Deliverables describing the indicator	European Commission (2022), Green City Accord, Clean and Healthy Cities for Europe, GCA Mandatory Indicators Guidebook, Version of 29 April 2022
Other indicator systems using this indicator	Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development

B-3.2.8: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Local RES energy production
Indicator Unit	MWh/year
Definition	Annual local renewable energy production. It can be inferred that this indicator will prove useful for tracking the impact of the installation and operation of renewable energy projects over time. It will allow for the analysis of the before and after situation, as following the installation and operation of renewable energy projects (or as the difference between the annual renewable energy generation related to the project compared to the BAU case. It is possible to divide the annual total energy consumption compared to a previous baseline or inventory, and then multiply by it by 100 to express the difference/result as a percentage.
Calculation	Annual local renewable energy production is calculated by acquiring the total renewable energy generation within the city each year. Relevant unit conversions are 1 J = 1 Ws; 1 kWh = 3,600,000 J; and 1 TOE = 41.868 GJ, 11,630 kWh, or 11.63 MWh (ITU-T L.1430: 2013)
Indicator Context	Local energy generation from RES represents by far the largest potential for GHG emissions reduction
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Local energy production from RES leading to lower GHG emissions
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	• Mobility & transport • Built environment
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	Energy production from RES
Expected data source	Energy Regulatory Authority
Is the data source local or regional/national?	National
Expected availability	Once a year
Suggested collection interval	2 years
References	
Deliverables describing the indicator	Informed by Bosch, P., Jongeneel, S., Rovers, V., Neumann, H.-M., Airaksinen, M., & Huovila, A. et al. (2017) CITYkeys list of city indicators.
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework

B-3.2.9: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Wellbeing of citizens (questionnaire)
Indicator Unit	Likert scale
Definition	The change in perceived wellbeing during the lifetime of the Climate-Neutral and Smart City Mission
Calculation	"A survey is used by sampling, asking questions asking participants about the amount they felt certain feelings. (more detail: NBS Appendix of methods pg. 989)"
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Physical and mental well being
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and 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
Data requirements	Results of the questionnaires
Expected data source	Survey organised by the municipality
Is the data source local or regional/national?	Local
Expected availability	The surveys will be organised by the municipality itself.
Suggested collection interval	2 years
References	
Deliverables describing the indicator	Urban Audit, based on Brazier et al. (1992) Validating the SF-36 health survey questionnaire: a new outcome measure for primary care, BMJ; 305,160.
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework

B-3.2.10: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Road Deaths
Indicator Unit	Number of deaths / 100,000 inhabitants
Definition	Number of deaths within 30 days after the traffic accident as a corollary of the event per annum caused by urban transport per 100,000 inhabitants of the urban area.
Calculation	"FR= EiKi* 100,000/Cap Where: • FR = Fatality rate [# per 100,000 urban area population per year] • Ki = Number of persons killed in transport mode i [# per year]

	• Cap = Capita or number of inhabitants in the urban area [#] • i = Transport mode"
Indicator Context	This indicator measures the success of efforts to increase the safety of pedestrians, cyclists, and drivers in traffic.
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No.
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes.
If yes, which co-benefit does it measure?	Increased safety in the traffic.
Is the indicator useful for monitoring the output/impact of action(s)?	Yes.
If yes, which action and impact pathway is it relevant for?	Building safe and comfortable ways for walking and biking/Infrastructure for pedestrians and bikers
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes.
Data requirements	Number of traffic accidents with fatalities in the city territory.
Expected data source	Police of the Czech Republic
Is the data source local or regional/national?	National
Expected availability	On demand
Suggested collection interval	2 years
References	Rupprecht Consult et al. (2020) Technical support related to sustainable urban mobility indicators (SUMI).
Deliverables describing the indicator	
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework
B-3.2.11: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Public Capital Invested in Climate Action Projects
Indicator Unit	€ million
Definition	Capital invested by the municipality in specific climate actions
Calculation	Annual Public Capital Invested in Climate Action Projects
Indicator Context	This indicator helps to calculate the effectivity of spent investments in relation to saved GHG emissions.
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No.
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes.
If yes, which co-benefit does it measure?	Finance and Investment/Public Spending
Is the indicator useful for monitoring the output/impact of action(s)?	Yes.
If yes, which action and impact pathway is it relevant for?	This indicator covers all impact pathways.

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes.
Data requirements	Investments spent in actions within the NZC mission
Expected data source	The municipality
Is the data source local or regional/national?	Local
Expected availability	Internal data
Suggested collection interval	2 years
References	N/A
Deliverables describing the indicator	N/A
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework

B-3.2.12: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Citizen involvement in co-creation/co-design of climate neutrality actions
Indicator Unit	Number
Definition	Number of people involved in participatory process set up during the design and implementation of the climate city contract action plan process.
Calculation	Total number of people involved during meetings for the co-creation or co-design of projects on social innovation and climate neutrality.
Indicator Context	This indicator measures the ability of the city to involve its citizens into designing the future form of the city.
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No.
If yes, which emission source sectors does it measure?	-
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes.
If yes, which co-benefit does it measure?	Social Inclusion, Innovation, Democracy and Cultural Impact/City capacities for participation/engagement
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	All fields of action/Social innovation
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes.
Data requirements	Number of citizens involved in the meetings regarding development of projects within the NZC mission.
Expected data source	The municipality
Is the data source local or regional/national?	Local
Expected availability	Internal data
Suggested collection interval	2 years
References	PHUSICOS (Grant Agreement no. 776681) In: European Union (2021c) Evaluating the Impact of Nature-based Solutions - Appendix of Methods pg.852)
Deliverables describing the indicator	
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework

B-3.2.13: Indicator Metadata	
(For each indicator selected)	
Indicator Name	GHG emission from grid supplied energy
Indicator Unit	t CO_2eq
Definition	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary
Calculation	Detailed calculation and scoping methodology described in GPC pages 56 – 75.
Indicator Context	Operation of buildings is the dominant GHG source in the city territory.
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Grid-supplied energy (electricity, heat, steam, or cooling)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	Yes (but it will be quite difficult to project future values, it depends on solar and wind power plants construction)
If yes, which action and impact pathway is it relevant for?	Technology/infrastructure
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	• Energy consumptions by sectors and energy carriers • Emission factors
Expected data source	• Municipality • Electricity and natural gas distributors • Energy Regulatory Authority • Teplárna Liberec (Heating company) • Termizo, a. s. (Waste to energy plant)
Is the data source local or regional/national?	All
Expected availability	Yearly on demand
Suggested collection interval	4 years
References	•
Deliverables describing the indicator	GHG Protocol for Cities (2020) Also informed by: IPCC (2006, 2019), NZC Info Kit for cities(European Commission 2021b)"
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework, GHG Protocol, ISO 14064, Reference Framework for Sustainable Cities

B-3.2.14: Indicator Metadata	
(For each indicator selected)	
Indicator Name	Negative emissions through natural sinks
Indicator Unit	t CO_2eq
Definition	"Natural sinks" refer to the planting of trees or other conversion of land use. Cities are allowed to account for negative emissions through the enlargement or enhancement of natural sinks within the territory to address residual emissions (accounting for all changes in the carbon stock). Carbon sinks should be accounted for as part of the 'AFOLU' sector of the GHG inventory and can be independently monitored as a progress indicator to show negative emissions.
Calculation	Refer to AFOLU indicators section
Indicator Context	Emissions are trapped in permanent grassland and arable land. We do not assume any changes in their area; therefore they will be constant. There would also be a sink from newly planted trees, this will be small initially and so we have neglected it. Otherwise 'mature' forests are more of a source of emissions.
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	AFOLU
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	-
Is the indicator useful for monitoring the output/impact of action(s)?	No, since we do not see any significant changes in the period till 2030
If yes, which action and impact pathway is it relevant for?	Revitalisation of city forests after bark beetle calamity
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	• New green areas, new forests planted in the cadastral area of the city. • Emission factors
Expected data source	• Municipality • Regional Office • Forests of the Czech Republic • Municipal Forests
Is the data source local or regional/national?	All
Expected availability	Yearly on demand
Suggested collection interval	4 years
References	•
Deliverables describing the indicator	Infokit for Cities (European Commission 2021b) Also informed by: IPCC (2006, 2019), NZC Info Kit for cities(European Commission 2021b)"
Other indicator systems using this indicator	NetZeroCities Comprehensive Indicator Framework, GHG Protocol, ISO 14064, Reference Framework for Sustainable Cities

4 Part C – Enabling Climate Neutrality by 2030

Part C “Enabling Climate Neutrality by 2030” aims to outline any enabling interventions, i.e., regarding organizational setting or collaborative governance models or related to social innovations – designed to support the climate action portfolios (Module B-2) as well as aiming to achieve co-benefits outlined in the impact pathway (Module B-1). These interventions also address the identified opportunities, gaps and barriers identified in Module A-2 and A-3.

Liberec aims to build on its previous success, having been regularly honoured in the nationwide competition with the award for “Friendly City Hall Office.” In recent years, the city's accessibility and openness, online communication, public involvement and participation, participatory budgeting, mobile application, interactive investment map, and the Citizens' Portal—an online platform for communication between the city hall and citizens on administrative matters—have been positively assessed.

4.1 Module C-1 Governance Innovation Interventions

This module details the city's governance innovations for achieving climate neutrality by 2030, describing innovations in institutional design, leadership, and collaborative and outreach processes, whether inter-organizational or internal to the key organizations responsible for the city's climate neutrality target.

So far, he climate agenda in Liberec is addressed at various levels, as previously mentioned. The final decision-making power rests with the city council, supported by relevant advisory bodies such as the Commission for Climate Neutral City. Mitigation activities are initiated and coordinated by the climate specialist (coordinator of the EU Mission), who is responsible for cross-sectoral coordination and works closely with the deputy mayor for energy and smart city, who holds political responsibility for the climate-neutral city. Given the complexity of the climate neutrality issue, other deputy mayors are also politically responsible, including those overseeing municipal housing and Local Agenda 21, architecture, public space and transportation construction, culture, education and tourism, spatial planning, property matters and sports, strategic development and subsidies, and technical infrastructure and IT, as well as social affairs. The city council holds decision-making power and is advised by the Commission for Climate Neutral City.

At the operational level, there are many departments involved, mainly the Architecture Office of the City, Department of Ecology and Public Space, Economics Department, Energy management department, Public Property Management Department, Department of Strategic Development and Subsidies, Department of Spatial Planning. All mentioned departments have their own role withing the climate-strategic planning and budgeting or within realization, implementation of measures and activities. Key stakeholders regarding mitigation activities are Teplárna Liberec (heating company), housing associations and cooperatives (buildings refurbishment), DPMLJ (transport company). Citizens are engaged in a form of participative budgeting and in case of various engagement instruments linked to the Local Agenda 21. All connections, including regional and national level, are described in module A-

3. Within the municipal structure, there is a missing position of the adaptation coordinator, in 2023 the Adaptation strategy was developed, but there is no one coordinating measures across relevant departments, as was mentioned above.

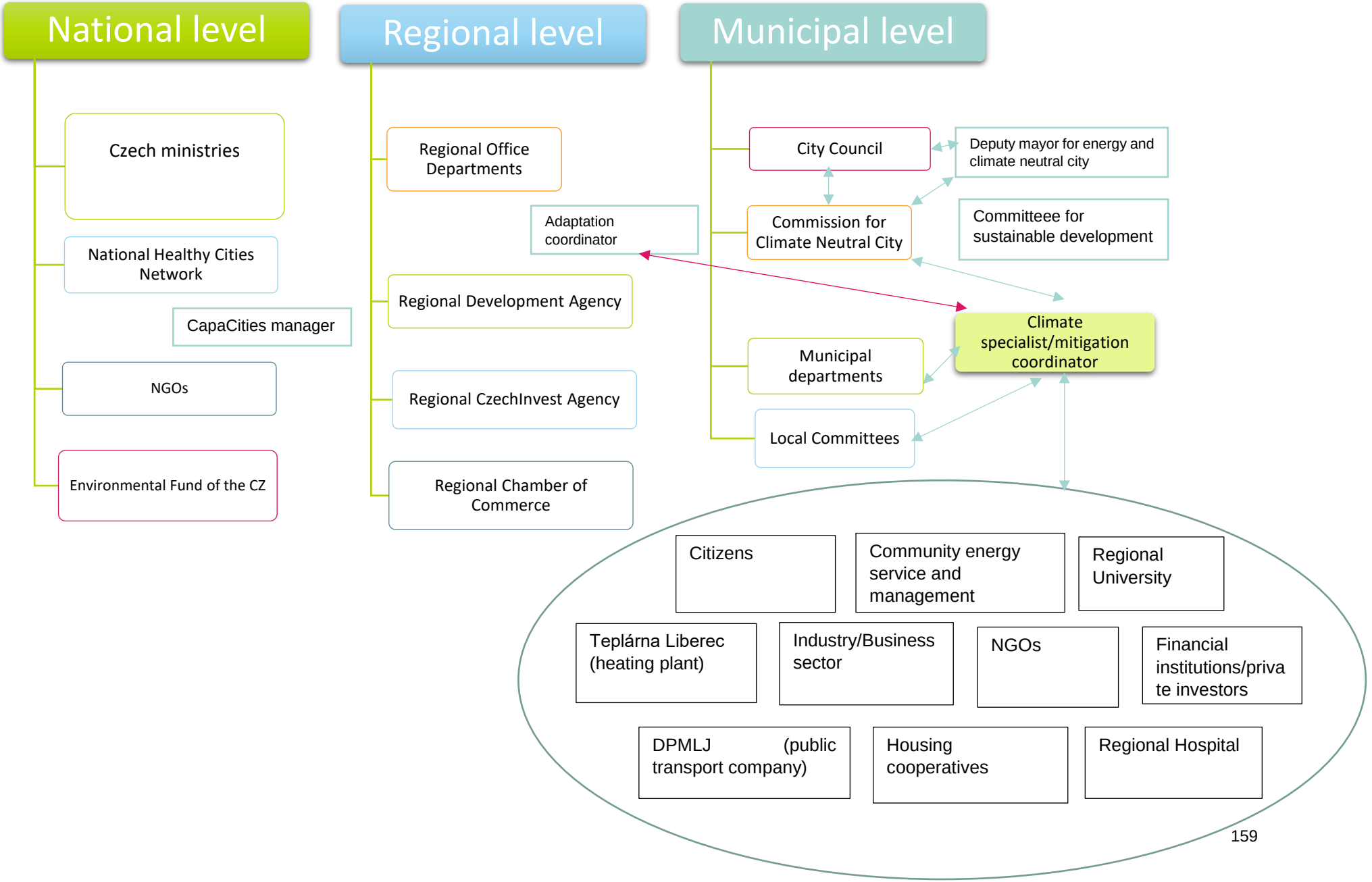
Governance innovation and a participative model will be crucial for the green transition in Liberec. The new governance model is designed to address identified barriers, with the most significant challenges being vertical links to other levels of government. As a result, we initiated discussions with regional and national authorities on climate neutrality and related tasks. The city must engage relevant organizations at both the regional and national levels and strengthen its internal capacities, both by increasing the number of professionals and enhancing knowledge. These efforts lead to governance innovation interventions, which are key to achieving the city's climate goals.

Besides the municipal level, the city was approached by the Ministry for Regional Development regarding the creation of a **"national platform"** for Czech cities with the ambition to become climate neutral. Currently, such a body or governance structure is missing, and it is necessary to establish one that supports Czech cities from a cross-departmental perspective and with shared responsibility. Liberec is sharing its experience from the Mission with the Ministry for Regional Development to help set up this body in a way that appropriately supports Czech cities. This support needs to be developed across various levels, including building internal capacities in terms of finance, knowledge, networking, and strategic planning, as well as addressing legislative and regulatory barriers and pushing for relevant amendments. Such a body would play an important role in further municipal development, and its establishment is expected to lead to governance innovations at the city level. This platform would serve as a key mediator between the city and the national level, introducing a new approach to cooperation with ministries and, importantly, a new way to share resources vertically.

Liberec also plans to collaborate with the regional office of the Liberec Region on this agenda, **sharing employees** to strengthen joint efforts. To support this, we intend to submit a common strategic integrated project proposal under the LIFE Programme. The project will likely focus on two key areas: nature and biodiversity, and clean energy transition, as well as climate change mitigation and adaptation. One of the anticipated outcomes of this project is the creation of a shared position for both the city and the regional office: **an adaptation coordinator**, which is currently lacking. This role would significantly improve the implementation of both the adaptation and mitigation strategies and enhance coordination between related activities.

In addition to the points mentioned above, climate mitigation policies should include specific conditions, rules, and requirements within municipal guidelines and directives. For example, these could apply to areas such as waste management and public procurement to ensure alignment with climate goals.

The following picture illustrates who holds primary responsibility for climate mitigation activities, policies, and cross-sectoral coordination of the climate agenda.


National level
Regional level
Municipal level
Czech ministries
National Healthy Cities Network
CapaCities manager
NGOs
Environmental Fund of the CZ
Regional Office Departments
Adaptation coordinator
Regional Development Agency
Regional CzechInvest Agency
Regional Chamber of Commerce
City Council
Deputy mayor for energy and climate neutral city
Commission for Climate Neutral City
Committeee for sustainable development
Climate specialist/mitigation coordinator
Municipal departments
Local Committees
Citizens
Community energy service and management
Regional University
Teplárna Liberec (heating plant)
Industry/Business sector
NGOs
Financial institutions/private investors
DPMLJ (public transport company)
Housing cooperatives
Regional Hospital

At the city level, there is a climate specialist/mitigation coordinator employed by the statutory city, working in the Department of Strategic Development and Subsidies. This department consolidates comprehensive knowledge of strategic documents, European programs, initiatives, and subsidy opportunities. The coordinator is responsible for cross-sectoral coordination, both vertically and horizontally. Within the city hall, their role involves integrating knowledge, activities, and resources from all relevant departments across the city to ensure cohesive climate mitigation efforts.

The coordinator is responsible for the city's climate ambition at the operational level

The decision-making power has a city council, coordinator is linked to the city council via **deputy mayor for energy and smart city** (one of city counsellors), who is primarily responsible for this agenda.

The deputy mayor is responsible for the city's climate ambition at the political level

City board has also established the advisory body **"Commission for Climate Neutral City,"** where deputy mayor is a commission chairperson. This commission meets usually twice a month, suggestions for each discussion are made by the chairperson and/or commission's members and/or by the coordinator. All documents that are supposed to be submitted to the city council are discussed in the "**Committee for Sustainable Development"** (also advisory body) as well.

Mitigation and adaptation activities will be coordinated directly between the adaptation coordinator and the mitigation coordinator through the Commission for Climate Neutral City. Beyond the municipal/city hall level, the mitigation coordinator is responsible for managing communication and cooperation between the city hall and other key local stakeholders. Many of these stakeholders participate in various municipal committees, commissions (i.e., advisory bodies), working groups, or common projects. For example, an important stakeholder is the heating plant Teplárna Liberec, considered a frontrunner in the city's climate efforts. This organization is progressive and innovative, testing many pilot projects in the field of new technologies and approaches in energy and construction. The heating plant is a key consortium partner in the project to establish sustainable community energy in Liberec, with its head of board serving as a member of the Commission for Climate Neutral City. Conversely, city councillors are members of the supervisory board of Teplárna Liberec. Many connections with key stakeholders in the city are natural, mutual, and long-term, with many stakeholders connected to the city through partial ownership).

An important role will be played by the Community Energy Service and Management Organisation, which will be established in September 2024. This organization will create new job positions and serve as a "mediator" between the municipality/city hall and housing cooperatives. Since these buildings are crucial stakeholders in community energy development and have a specific ownership structure (requiring 100% approval from all owners), it is essential to communicate closely with them. Building trust and providing all necessary information for decision-making—such as details about benefits, costs, impacts, and co-benefits—will be key to fostering their participation.

Beside the municipal level, coordinator for mitigation has also connections to regional and national level.

Participation of citizens

Public participation in all processes, including both the wider public/citizens and professional stakeholders, is a crucial aspect of governance in any city operating within a democratic society. Liberec recognizes this and continues to improve its participation methods, both in terms of the techniques used and the occasions on which they are employed. However, there is still a need to reach a broader audience, increase public interest and understanding, and build mutual trust (trust in our work, our knowledge, and opinions).

Within the CCC design process, we identified a strong potential for collaboration with the regional level—both with the professional public and citizens. This is especially relevant considering the responsibilities of the Regional Office of the Liberec Region in education and public education, as well as the focus of the Regional Development Agency. Additionally, we see great potential for joint activities in public education with the industry sector. By pooling our resources, we can reach a broader audience and use this opportunity to foster further cooperation beyond Corporate Social Responsibility.

In Liberec, various forms of citizen engagement and participation are used, particularly in strategic planning. However, as previously mentioned, there remains a barrier in achieving the desired level of feedback and responsiveness from citizens. This presents an opportunity to reassess and redesign the participation process, including the methods and channels used to reach citizens. It is crucial to assure citizens that their opinions are valued and will genuinely influence decision-making. To address this, the participatory method of a "citizens' assembly" has been under consideration. This approach ensures that citizens are provided with sufficient knowledge to fully understand the issue at hand. Moreover, it guarantees that if a certain level of agreement is reached (e.g., 80% of the citizens' sample), the city council must discuss or even approve the proposed solution. The method involves selecting a representative sample of citizens across the city. However, it is also recognized that this method is relatively expensive and time-consuming, both for the city hall in terms of preparation and for the participating citizens.

In general, there is a need to test new forms of participation where engaged citizens are first educated and more motivated to participate. When decision-making power is transferred from top to bottom, citizens should be provided with comprehensive background information. This is similar to the situation with city councillors, who must make decisions based on complete knowledge, including municipal barriers, and consider all interests (not just partial ones) to evaluate all facts and possibilities effectively.

Citizens are informed via various channels or in case of below mentioned events/opportunities:

- Municipal newspaper
- Social media (Facebook) and City Websites
- Specific events (as European Mobility Week)
- Various roundtables
- Leaflets (for example in public transport, in city hall), brochures, etc.
- Media (TV, radio, regional press)

- Activities of mayor deputies, for example there are regular visits to the city's districts where citizens can meet deputies and discuss their local problems, the city mayor has meetings with citizens as well.

More important are forms of **active participation**:

- **Local Committees** can be established by citizens under the Act on Municipalities 128/2000 Coll. These committees serve as advisory and initiating bodies for the city council. They are authorized to submit proposals to the city administration regarding the development of specific localities and the municipal budget, provide feedback on proposals from the city management, and comment on citizen initiatives submitted to municipal authorities. Recently, the effectiveness of these committees has been questioned, and the opportunity for their full cooperation with the city hall has not been fully realized. To address this, a working group was formed to draft new rules for their operation and organization, with plans to transform them into **local commissions**.

- **Working groups** are established when the city needs to address specific topics, particularly in the context of strategic planning. These groups provide the city with public opinions and expertise in various fields. Typically, professional working groups are formed, such as those involved in developing the Sustainable Urban Mobility Plan or the Local Energy Strategy. Citizens are more actively engaged when developing the city's master strategic plan. For example, in the last update, the following working groups were formed: Education, Business and Employment; Social Services, Health and Safety; Sustainable Development; and Culture, Sports, and Tourism. The outputs—measures and projects included in strategic documents—are based on a combination of professional expertise, often through outsourced analysis, and public input, including opinions and desires. This process is significant because the CCC Action Plan serves as an umbrella document for all strategic plans of the city, with its outcomes rooted in existing strategic documents and action plans, reflecting previous work and public participation).

- **Participatory budgeting** is a program designed to engage citizens in the budgeting process and improve their surroundings. A specific amount of money is allocated from the budget for citizen-driven projects. Residents submit their ideas and project proposals, usually through an online platform, allowing them to take an active role in shaping their community online (www.tvorimeliberec.cz). The allocated amount is increasing every year, there are three categories of projects – super-large projects up to 80 000 EUR, large projects up to 40 000 EUR, and small projects up to 16 000 EUR.

- **Healthy City of Liberec campaigns and events**: Liberec is a member of the National Healthy Cities Network and participates in various international campaigns such as European Mobility Week and World Heart Day (in Liberec). The city also organizes events and campaigns focused on waste management and cleaning, such as Earth Day and "Let's Clean Up the Czech Republic" (part of "Let's Clean Up Europe"). Additionally, there is a public competition called "I Walk" aimed at promoting active mobility.

- **Community planning (social services planning)** is planning of services in social area and the core of this planning is that social services can be openly and publicly planned and thus, they can fully meet the citizens 'needs. This process is open and cyclical, anyone can participate, and there are mainly representatives of users, providers, contractors of social services. Community Plan is developed/updated for five years and for each year is prepared action plan. Besides, when occurs new topic in the city, new circumstances, everything is discussed in working groups where wide public participates or is represented by a mediator. Public is involved in working groups where there are following ones: WG for people with disabilities, WG for elderly, WG for mental health, WG for children and youth, WG for people at risk of addiction, WG for people at risk of social exclusion, people in crisis and without shelter, foreigners and minorities. These target groups are mainly represented by mediators which are usually workers of social services that are used to work with them on daily basis. This process is described in more detail bellow.

- **Surveys/questionnaires** (online, in the newspaper) and **feeling maps**: when we want to reach, meet citizens' opinions/habits/preferences/choices, we often use various surveys (often connected with bellow mentioned feeling maps). Feeling maps are great instrument to connect opinions/problems/barriers/projects with specific locality in the city. Citizens can show where they sport, where they feel well, safe, where is wrong traffic situation, etc.

- **Civic forums** that are held every two years, these forums are facilitated and focused on a few development areas of the city (economy, social services and health, environment and climate-neutrality, transportation, technical infrastructure, culture, education, and sports, etc.). Citizens are invited to share their priorities including barriers for further development, there are various „tables" for each topic, all priorities and ideas are scored, and the score is validated via online survey to reach higher audience (more representatives of the city).

- **Interviews** (in person or by phone), for example we used interviews in case of developing Sustainable Urban Mobility Plan (SUMP) or in case of parking in housing estates regulation design. In SUMP, there was paid attention to well set-up sample of citizens (age, gender, district). In the field of transportation as such, we plan to test new types of citizens 'engagement to the process of parking regulation design related to the ELABORATOR project (sustainable mobility towards the Climate neutrality).

- **Roundtables and workshops**: roundtables and workshops are used to discuss specific problems/barriers/opportunities in case of specific projects or areas of municipal development. We use the National Healthy Cities Network representatives as facilitators, and we usually organize these roundtables and workshops for professional public – so far. Regarding the Climate agenda, we plan to organize workshops for professional public and for citizens in the field of energy to raise awareness and understanding about topics as energy savings, community energy and its benefits, energy poverty, technical and smart technologies, funding possibilities etc. Roundtables also serve as initiation of further communication with specific stakeholders.

- **Reminding strategic documents**: when developing strategic documents, drafts are published online on the city's website or introduced publicly in person. This allows the public to review the core of the documents, including the vision and goals, and provide feedback on any missing elements or suggest amendments. In some cases, we maintain records of all public comments and provide statements on how those comments were addressed.

Participation of vulnerable groups of citizens

A specific aspect of public participation involves engaging vulnerable groups of citizens. In Liberec, as in any city, these groups include people with disabilities, the elderly, children and youth, girls and women, carers, people at risk of addiction, those at risk of social exclusion, individuals in crisis or without shelter, foreigners, and minorities. These groups are often considered vulnerable in many situations, and their inclusion in public participation processes is essential to ensure their voices are heard and their needs addressed.

In general, a highly visible group in Liberec consists of people at risk of poverty and social exclusion, which is more economically than spatially driven in the city. These individuals often reside in socially excluded areas and experience a combination of various challenges. Within this group, a significant portion belongs to the Roma community living in Liberec. People at risk of poverty and social exclusion are often characterized by low educational attainment (elementary education), long-term unemployment, debt, dependency on social financial transfers, and/or being elderly, or having low competencies for managing life situations (such as individuals with mental illness). This group represents around 6% of the city's population, with about two-thirds of them being from the Roma community.

The participation of these vulnerable groups of citizens is both specific and complex. Within the CCC process, this topic was discussed with Daniel Amann (Transformative Learning Expert at The Democratic Society), the Social Department of the City Hall, the Housing Centre of Liberec, and representatives from the non-profit organization People in Need. The aim was to gain a comprehensive understanding of how to work effectively with vulnerable groups in Liberec, what key issues need to be communicated with them, and how best to reach them—through appropriate mediators and using effective communication channels.

- Currently, at the municipal level, vulnerable groups of citizens are primarily engaged through the community planning process, which is a key priority in municipal governance and provides the main opportunity to reach these groups. In general, all citizens, regardless of ethnicity, gender, education, age, etc., are invited to participate in strategic city development, participatory budgeting, community planning, social housing discussions, and public consultations on specific projects.
-

Community planning is a collaborative process for planning social services. We have found that the most effective way to engage vulnerable citizens is through mediators. These mediators are typically social service providers, such as non-profit organizations or municipal/regional bodies, including the social department. These mediators work with vulnerable citizens on a "daily basis," which is crucial because their relationships are built on trust and understanding, a process that takes time. Despite these efforts, feedback, interest, and willingness from vulnerable citizens to participate in these processes remain lower than desired. The information flow commonly works as follows:

As mentioned above, feedback is not as high as desired, and many vulnerable individuals are not interested in participating in municipal processes. They are often preoccupied with their own challenging living situations and personal interests, and many feel powerless to effect change. However, participation in community planning has been effective, following a specific process illustrated in the picture above. Target groups, either independently or through mediators, join working groups that serve as both problem solvers and initiators in the community planning process. This allows the city to receive all necessary information, which is then passed to the Regional Office, the decision-making body for social services in the region. Apart from community planning, social housing in Liberec has also been successful. Social housing is a specific part of social services planning and operates similarly to community planning. It is a high priority in Liberec, with the **Housing Centre of Liberec** serving as a contact point for individuals and households in need of housing assistance, particularly low-income groups. The centre plays an important role in preventing housing loss and combating energy poverty. It works closely with relevant social service providers, and its core processes mirror those of community planning.

In recent years, the focus on energy, energy savings, and heat sources has gained increasing importance. The Housing Centre staff engage with vulnerable individuals and households to educate them on how to achieve energy savings through basic measures and controlled consumption, distributing leaflets to raise awareness. The Housing Centre has become a vital part of social services, and its team was honoured by the Czech Streetwork Association for their exceptional work and long-term contribution to society. Following discussions about engaging vulnerable groups of citizens in the CCC process, it became clear that the most effective approach is to communicate through "tangible" projects, such as community energy development, which offer clear benefits (e.g., lower energy costs). Additionally, we aim to build on the existing relationships between vulnerable citizens and the mediators who have already established trust and experience with them through social work. Strengthening these trusted relationships is crucial for further engagement.

We also recognize the importance of peer workers and consultants, who are often more effective at building trust with vulnerable citizens. The city's initial experience with peer workers came through crime prevention assistants and "janitors," who are peer workers assisting professionals in working with vulnerable groups as part of ongoing European projects.

In June, a roundtable and workshop were organized on the topics of energy poverty, building refurbishment, and community energy development. The event included participation from representatives of two ministries—Ministry of the Environment and Ministry for Regional Development—as well as representatives from the Technical University in Liberec, the Regional Development Agency, and other key stakeholders. The event began with an introduction to the concept of community energy, highlighting its benefits and its potential to address energy poverty and support the development of renewable energy sources. The Social Climate Fund was also introduced, with a focus on the opportunities it presents for refurbishing buildings for low-income households and supporting vulnerable users in public transport.

The workshop that followed was facilitated to encourage brainstorming and discussion on how to effectively communicate the impacts of climate change to vulnerable groups of citizens, and how to motivate low-income households to adopt new habits and make decisions that contribute to sustainability.

Given what was mentioned above, more governance and social interventions and innovations can be expected in the coming months and years. The understanding of the importance of public participation has been growing and is emphasized at many levels.

The following table presents the actions taken by the city so far, along with the governance changes initiated since joining the EU Mission and committing to climate neutrality. This commitment required the establishment of specific structures and systems to empower the city in this field and ensure that there are dedicated capacities and roles responsible for achieving the city’s climate neutrality ambition.

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
Commission for Climate Neutral City	Advisory body of city board (selected city counsellors) established after Liberec joined the EU Mission	1.2 8.1 8.2 8.4 10.1 10.2 10.3 *1.12* *5.6* *5.8* *6.8* *7.8* *8.5* *8.6* *8.8* *8.9* *8.10* *10.4* *10.5* *10.6*	• Commission consisting of 9 members representing following stakeholders: **Teplárna Liberec, Regional Office of the Liberec Region, civic society, non-profit organisation aiming at climate neutrality, of business sector, representative of research in the field of the environment** (anthropogenic pollution). • Since Commission is advisory body, city board, city counsellors are stakeholders involved. • In the end, citizens are important stakeholders involved since city counsellor make decision directly influencing citizens of Liberec.	This intervention reinforced the city commitment and importance within the city council, this is first advisory (professional) body established for the city council so far, improved decision-making processes in this field and improved knowledge background of the city council	
Coordinator for mitigation/Climate specialist	Within the Department of strategic development and subsidies is a position of a climate specialist who is a worker dedicated for the CCC work first, the focus will be	1.1 1.2 1.3 1.4 1.5 3.5 7.2	• **City council**, mainly deputy mayor responsible for climate and SMART agenda in the city, politicians who have decision-making power.	Climate specialist is major employee at operational level in the city who is responsible for climate agenda, because of this municipal dedicated capacity, there	

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	paid on coordination of mitigation activities in the area of the city, on fundraising and on communication with (both on vertical and horizontal line). This coordinator works closely with Adaptation coordinator and Finance expert. This is a new position responsible for coordinating the climate agenda in the city which is a kind of governance innovation enabling strengthening the commitment across the city and building internal capacities for this agenda as well.	8.1 8.2 8.3 8.4 9.1 9.2 10.1 10.2 10.3 1.*12* *4.8* *4.9* *8.5* *8.6* *8.10* *8.11* *9.7* *10.4* *10.5* *10.6*	• **Commission for Climate Neutral City** as a body responsible for discussing all measures and activities related to climate agenda of the city before they are approved by the city councillors. • **Adaptation coordinator** works together with climate expert to coordinate adaptation and mitigation activities in the city. • **Finance expert,** who works closely with climate specialist in the field of finance, fundraising for climate projects. • **Other key stakeholders** at all levels, all stakeholders defined above, for example Regional Office of the Liberec Region, Ministry for Regional Development, Ministry of Industry and Trade, • **Citizens**, in coordination with employee responsible for Local Agenda 21, climate specialist	is higher success of CCC Action Plan project portfolio implementation and thus, emissions reduction/cut.	

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
			coordinates mitigation activities in the field of citizens' engagement, co-creation process etc.		
Coordinator of Adaptation Activities	New position improving successful realization of adaptation activities in accordance with municipal strategic documents (Adaptation Strategy above all) and improving coordination and synergies with mitigation activities (measures) in the city. This position will be established within the city hall organisational structure or within the Regional Office organisational structure.	1.1 1.2 1.3 10.1 10.3 *1.12* *5.4* *5.8* *8.5* *8.6* *8.10* *10.4* *10.5*	• Involved stakeholder should be the **Regional Office of the Liberec Region** since there could be shared position of adaptation both for city and the region. • At the municipal level, within the city hall, in the field of adaptation activities are important workers from the **Architecture Office of the City** who have the main responsibility for adaptation activities, in cooperation with the Department of the Environment	This intervention shall lead to improvement of coordination between adaptation and mitigation activities and improve green-blue infrastructure in the city	New jobs creation
Finance and Investment expert	For the implementation of this CCC Action Plan, crucial is to overcome the finance-gap. Currently, the city hall is undersized in the field of capacity, both in terms of finance and employees. We plan to hire new person that will cooperate with	1.1 1.2 1.3 1.4 1.5 2.1 3.2 3.5 4.2	• **Coordinator for mitigation** • **Coordinator for adaptation** • **City council** • **Financial sector, financial institution, private investor** • **Managing authorities of subsidy programmes**	Finance expert significantly increase success of projects realization since the major barrier/risk is insufficient finance for projects implementation. In coordination with climate expert, there are seek new finance	New jobs creation, finance, social innovations, budget savings and private capital involvement

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	coordinator for mitigation and coordinator for adaptation and contributes to increase in capacities in terms of finance. We need to focus on public money as subsidies, to help to search for relevant subsidy titles and write proposals. Furthermore, what is more important, is focus on private capital, we need to learn how to attract private investors, to develop bankable investment concepts and plans. We will be able to use knowledge and synergies from relevant Horizon projects (TURNAROUNDMONEY, CLIMATEFIT), and to use experience from the NZC Capital Hub which we plan to use as well. As a professional can discuss this topic with city council properly. We expect that this governance innovation	*1.7* *1.8* *1.12*		opportunities and possibilities, both coordinators will test some pilot projects in the field of financial innovation and learn how overcome finance-gap and involve more private capital in mitigation activities finance.	

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	shall lead to social innovations development in the city.				
Facilitator for communication with industry	We want to hire a facilitator, who should help the city communicate properly its ambition to two industrial zones in Liberec. The aim is to move forward this CCC work and to go further and to engage more industrial enterprises. For this we also want to use the example of large industrial company Denso Manufacturing Czech (a part of the global Denso that has committed to carbon neutrality in scope 3 in 2035), which is a company that is opened to share its experience and best practice with other enterprises in Liberec	1.2 1.3 6.2 6.1 10.1 10.3 1.10 6.5 6.7 6.8 10.5 10.6	• **Industry** • **Denso Manufacturing Czech** • **Politicians** • **Coordinator for mitigation)** • **Ministry of Industry and Trade**	The aim is to activate and motivate industrial enterprises in Liberec, to provide them with support to speed up their green transition (cut in GHG)	Increased number of skilled jobs & rate of employment Increase in private investments. Building functional relationships with key stakeholders (commonly shared commitment and vision) leading to higher commitment and to increase in co-design and co-fund of Climate actions Increased investments in R&I Air and noise pollution decrease Shared vision, understanding, comprehensive

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
					knowledge related to climate change
Municipal energy management department	New department established in 2022, focused on continual improvement of municipal energy management leading to the ISO EU 50 001 certification. City keeps developing energy management, currently mainly in line with community energy development. City needs to raise money to enable further development in this field. We submitted proposal on energy savings (buildings refurbishment and energy management of the city) to the EUCF programme for this reason.	1.2 1.6 4.1 4.2 4.3 8.1 8.2 *2.6* *4.7* *4.8* *4.9* *4.10* *4.11* *4.13* *4.15* *4.16*	• **Municipal organisations and institutions including public benefit organisations** that are managed and influenced by the city in the field of energy (consumption, monitoring, smart solutions etc.). • **Community Energy service and management organisation** that will be responsible for community energy development in Liberec which will be in line with municipal energy management development	This intervention leads to energy consumption reduction which means the GHG reduction. In case of successful certification city need no energy, audits which means budget savings in projects' documentation preparation	New jobs creation, smart solution, contribution to improving innovative environment in the city, contribution to the project of community energy development, less air-pollution
Community energy service and management organisation	The umbrella organisation managing energy community/communities in Liberec and serving as advisory body/on-stop-shop for citizens. Main	1.2 1.3 8.1 8.2 8.3 8.4	• **Pilot City Project consortium** : heating plant Teplárna Liberec, Technical University in Liberec, • **housing cooperatives in Liberec,**	Organisation will be responsible for management and further sustainable development of community energy in Liberec which will lead to higher share of	**New jobs creation, air quality increase, energy poverty cut, decrease in energy prices, increase in renewables construction,**

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	goal of this organization will be to cover all activities as administration, management of energy flows, service, etc.). Such organizations needs to have specific know-how, competences, and appropriate technical equipment. Following special analysis, it seems to be best option to establish a community for renewable resources which would take the legal form for of a cooperative.	*4.7* *4.8* *4.9* *4.10* *4.11* *4.12* *4.16* *8.5* *8.6* *8.7* *8.11* *10.5*	• **citizens (households),** • **business, industry sector**. Development of community energy in Liberec has a few phases where there actually everyone from the city can benefit from the community energy. • Specific stakeholders involved are **vulnerable groups of citizens – low-income households** facing energy poverty. • Liberec as a Czech pilot city in the field of energy community can share best-practice with other **Czech cities**.	renewables in energy mix and energy savings in the city and thus, to GHG reduction	community energy concepts as a **tangible project** for initiating communication about climate-neutrality awareness with vulnerable groups of citizens and business sector, i.e. project with clear benefits.
Mediator for the city (community energy service and management organisation) and housing cooperatives	This mediator has a crucial role in raising awareness about energy community concepts, about climate-neutrality and about RES construction and in case of housing cooperatives. The aim is to activate housing cooperatives to become members of energy community. There is important the	8.1 8.2 8.3 8.4 *8.5* *8.6* *8.10*	• **Housing cooperatives in Liberec** • **Community energy service and management organization** • **The Regional Development Agency (Energy Platform under the ARR)** that will cooperate with the city in the field of workshops	There are two points how this mediator shall enable climate neutrality. First, it should increase the number of community energy members which is crucial for the success of the energy community concepts (leading to the GHG reduction). Secondly, the mediator's role is to raise awareness about climate-neutrality	Improved air quality Reduced noise pollution Increased road safety Improved quality of life and improved air quality, time savings, citizens' health improvement Public space re-design in favour of citizens/residents,

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	connection, relationship, between the mediator and the chairpersons of housing cooperatives. For communication, raising awareness and sharing background information and knowledge serves also the online platform.			as such which should lead to change in decision-making patterns and lead to GHG reduction in the end.	pedestrians, in line with adaptation actions (blue-green infrastructure, greening the city) Contribution to liveability of city centre, city centre more attractive for living Participatory approach (strengthened commitment/vision across the city), focus on acceptance of suggested solution both by politicians and residents. Increased investments in R&I Improved movement in the city
Gender Equality Plan and its regular monitoring and evaluation	After Liberec became a mission city and decided to take new approaches in capital planning and funding, we developed the Gender Equality Plan, including its monitoring and evaluation. It occurred to be a good opportunity to	8.1 8.4 10.2 *4.10* *4.14* *10.6*	• **Municipal employees** are influenced by the GEP directly since this should lead to overall change in organisational culture. In the context of the mission, such culture should be more innovative and changes-friendly/opened, which is crucial	Successful GEP implementation leads to improved and diversified organisational culture towards the environment providing employees with positive motivation, openness to their opinions, environment enabling shared values	

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	reflect the gender perspective in Liberec and it pushes things forward since the city has committed to report relevant statistics annually. The GEP's content is work-life balance and organisational culture, gender balance in leadership and decision-making, gender equality in recruitment and career progression and measures against gender-based violence. There have been dedicated specific sources to its implementation and training across the city hall, responsibilities for data collection and monitoring as well.		governance change across the city hall. Wide range of employees and clerks are trained in this field and the issue of equality in wages/career progression is even more openly discussed topic. • **Personnel Department** is responsible for the data collection and monitoring, for selection of possible training courses for all employees/for employees in leadership of departments ; personnel department also participates in various projects related to the issue of work-life balance, gender-based violence including sexual harassment, which should lead to increase in their expertise in this field and learning how to deal with these issues.	and vision across the city hall, also employee retention, etc. In the end, it leads to better position to innovative processes, to openness to test new approaches, technologies, to boost innovations internally, that all shall lead in GHG reduction in the end.	
Citizens' Portal for communication	This portal/platform, launched in 2022, plays the important role in the public administration	10.2 10.6	• **Citizens,** this governance innovation leads to their better comfort, it saves their time and money (for	In general, such innovation leads to perception of digitalisation, innovative	

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
between citizens and city hall	digitalisation. Citizens can newly submit forms electronically or pays municipal fees online. This platform also enables to track and control all obligations to the municipal office including submissions and ongoing and completed proceedings.		travelling to the city hall in person), provides them with better control and tracking related to their obligations. • **City hall employees** benefit from this innovation in the form of time savings and better tracking of all demands and obligations.	approaches and moves public to better innovation and any changes acceptance slightly when there is crucial behavioural change for emissions cut.	

4.2 Module C-2 Social Innovation Interventions

This module lists the actions taken by the city to support and foster social innovation initiatives or non-technological innovation more broadly (e.g., in entrepreneurship, social economy, social awareness & mobilization, social cohesion and solidarity, etc) aimed to address the systemic barriers and leverage the opportunities identified in Module A-3.

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
Online platform related to energy community development and raising climate neutrality awareness	Online space bringing together. all stakeholders sharing interests towards reducing city emissions and related topics. Possibility for interaction, organisation of the events, potential for personal log in of the energy community members in order to have an overview of energy efficiency within community, car sharing potential. There will be many functionalities, beside sharing information, documents, municipal activities, there will be calculation module determining the effectiveness of measures (insulation, windows replacement, accumulation of heat in water etc.). Currently, there is basic setting of this platform but there is intended to extend it, there will be private section for community members enabling online monitoring of energy consumption, management of energy consumption based on current production (solar and wind	8.1 8.2 8.3 8.4 10.1 10.2 10.3 *1.12* *2.6* *3.7* *4.7* *4.8* *4.9* *4.11* *4.15* *4.16* *8.5* *8.6* *8.8* *8.10* *9.7*	• **Community energy members** which means (in last phase of community energy development) municipal and regional organisation and institutions, citizens/households (family houses), housing cooperatives, businesses • **Teplárna Liberec** (Pilot City project consortium partner and crucial stakeholder and frontrunner in the field of energy in Liberec), as the user of the platform • **Transport company of the City** (DPMLJ, transport company will be important stakeholder as consumer of energy (electricity from RES and biogas from the biogas station), as the user of the platform • **Technical University in Liberec**, as a project consortium partner, crucial stakeholder in the field of research and innovation, education in the field of energy, raising	First, platform shall activate potential members to become energy community members which shall lead to improvement in energy mix in favour of renewables, lead to energy savings and thus, to GHG reduction. Furthermore, online platform will serve as crucial instrument for online public education and sharing best practice and thus, should lead to behavioural change in many fields regarding the climate change impacts. In case of other cities following our experience, there shall be desired change in those municipalities as well.	Energy security, energy independency, energy poverty reduction (lower energy prices), governance innovation – more participative approach when citizens take hands-on approach and responsibility, they are engaged in pricing etc. Other co-benefit is contribution to innovative environment, SMART solutions development, strengthening the cooperation with academia in the city

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	power) and storage, billing, and accounting module. Online platform is the output of the Pilot City Project called the Initiation of Sustainable Community Energy for the City of Liberec		new professionals, using online platform actively • **Professional public at local, regional, national and EU level:** Liberec already shares its experience with professionals in the field of energy, SMART solutions, etc., the online platform is intended to be online public space for sharing. • **Other cities:** as mentioned above, Liberec already shares its best practice in the field of energy and the platform serves as the online space – online knowledge repository for other cities		
City as the innovation focal point	Liberec as innovation focal point (cooperation with innovative companies, testing new technologies, pilot projects based on peer learning from abroad, for example in cooperation with the Ministry of Industry and Trade. Working and co-creating with start-ups, networking, in this field Liberec plans to cooperate with regional	1.1 1.3 4.1 4.3 6.1 6.2 6.3 10.1 *1.8* *1.10*	• **Ministry of Industry and Trade**, we started cooperation in the field of innovation and SMART solutions, Liberec should become one of pilot projects/cities in the Czech Republic, ministry also shares its contacts (at the international level)	Technologies leading to energy savings and thus to GHG reduction and technologies in the field of carbon capture and storage	Other social innovations, possibility of new jobs creation, contribution to innovative environment development, development of financial innovations in Liberec (new ways of funding new

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	CzechInvest, TAČR, ARR and industry enterprises in Liberec	*1.12* *4.8* *6.5* *6.6* *6.7* *8.7* *8.8* *8.10* *9.5* *9.7* *10.4* *10.5* *10.6*	• **CzechInvest**, this agency is a good contact point for testing new approaches and to connect with start-ups. • **TAČR**, this technological agency is important stakeholder in the field of research and development. • **Regional Development Agency :** is municipal connection to the Liberec Region and regional businesses. • **Innovative businesses and start-ups**		technologies and solutions)
Systematic cooperation with the academic sector	University represents important stakeholder for the city for many reasons and there can be seen following levels of cooperation : - University as a regional centre of research, development, and innovation (and thus, project partner in relevant projects) - University as a regional centre for raising, educating new professionals in the field of energy, buildings' construction, transportation	1.2 1.3 8.1 8.2 8.3 8.4 10.1 10.3 *1.7* *1.12* *8.5* *8.6* *8.7*	• **Innovative businesses, businesses with high value-added, start-ups, industry enterprises,** their role is disseminating innovation, to form their demand on professionals (regional labour market) • **Regional labour market**, there will be changes both on side of demand and supply	Effective and functional cooperation shall lead to innovation dissemination in region (and beyond Liberec region as well), to contribute to piloting, testing new technologies, innovative and SMART solutions, to meet demands of labour market, i.e. to raise professionals in line with overall trends, with	New jobs creation, new governance innovations, contribution to the innovative environment development, higher level of innovation dissemination

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	(low-emission transport) and in other areas NEW SYLLABI - University as a member of community energy For this cooperation, the pilot city project was the main initiation (cooperation of the city, university and other stakeholders in the field of community energy development and low-emission transport), the regional university is a consortium partner and naturally, we started to cooperate at more levels, to connect our agendas, projects and knowledge. We also engaged students in the project (contracted them). Beside the role in the field of research and development, we see university importance in raising new professionals in areas relevant to mitigation and adaptation activities, mainly in the field of energy, in Liberec, there are mainly energy managers missing. Since we've been developing municipal energy management, we keep searching for new employees	*8.8* *8.9* *8.10* *8.11* *9.5* *9.7* *10.4* *10.5*		the city's, regions and businesses' requirements. In the end, as consequences of above mentioned, to contribute to behavioural change in the city, to influence the energy mix, level of energy savings and thus, level of GHG reduction in the city.	

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	who would be beneficial for municipal progress, and we are focused on students' potential as well. Academic sector, regional university, will also play important role in public education, in raising awareness about climate neutrality in the city				
Local Commissions (Manual for Local Commissions)	According to the Act on Municipalities 128/2000 Coll., there can be established local committees as an advisory and initiating body of the city council. Currently, in Liberec there are 14 committees, some of them are active, some of them are not. In general functioning of these committees has been doubted for not meeting the fully potential of them for the cooperation with the city council (city hall). For this reason, there was developed new manual overcoming current gaps and problems and leading to higher engagement of committees and former committees will be transformed into commissions.	1.2 1.6 8.1 8.4 9.2 9.4 10.1 10.2 *1.12* *8.5* *8.6* *10.6*	• **Citizens** as members of local commissions will be provided with better rules and opportunities to participate, in general, it should influence all citizens of the city positively, to improve the whole environment and the participatory model of the city. • **City council** should be provided with better information and knowledge on local specifics and to use the commissions' potential fully.	Better participation of local districts, it is important for overall understanding and willingness to behavioural change, sustainable way of behaviour, to share vision and goals in this field. All this leads to GHG reduction in the end (sustainable choices in the field of energy, transportation, food, waste production etc.)	Participation, new social innovation
Manual of public spaces	This manual was described within section A-2. This manual	1.2 1.3	• **Citizens**, since this manual shall lead to improvement of	This manual aim more on adaptation activities,	Support of participatory methods,

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
of Liberec : blue-green infrastructure	is innovative with its content and the idea behind that. It is first of a row of manual aiming at specific parts of sustainable development in the city, representing specific examples, best practice, inspirational approaches, beside this manual is designed in a way when can be amended, updated, and complemented. What is the innovative feature is that there are set up specific rules for design and management of public spaces/projects proposals when these rules aim at improving the climate resilience of the city, projects are based on participatory and multidisciplinary approach etc.	1.6 7.1 10.2 10.3 *2.10* *3.12* *7.7* *7.8* *7.10* *10.4* *10.6*	public spaces co-creation with the view of blue green infrastructure • **City hall employees and clerks**: manual helps them in their work agenda, mainly in case of Architecture Office, Public property management department. • **Professional public**, as public space designers, architectures, will be provided with better rules how to create the municipal public spaces and what are the city's priorities in this field.	on resilience of the city but the aim should be higher quality of public spaces including public greenery and as such there should be higher level of CO2 sequestration in the city	
New comprehensive municipal system of participation, facilitation and public education including new visual brand identity/image	For the overall transition of the city, shared vision and commitment is crucial. This is why we need to improve, enforce the participation system of the city, including all target groups of public and testing new approaches, new participatory methods for different groups. The part of it is to establish new system of in-formal education,	1.2 1.3 1.6 2.5 6.1 7.2 8.1 8.2 8.3 8.4 10.1	• **Citizens :** engagement in terms of participation, public education, focus on various (all) target groups including vulnerable groups • **Professional public and business sector:** engagement of all key stakeholders at the city level, the aim is to cooperate more closely and to increase their	This intervention leads to improved knowledge, understanding, higher trust, improved participation of public, which leads to strengthened commitment and shared vision across the city, which is crucial for climate strategic	Increase in decentralisation, multi-governance ; Improved access to information, awareness & behaviour change ; Shared vision, understanding ; comprehensive knowledge related to climate change ; Increase in decentralisation, multi-governance ; New jobs

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	together with regional office, aimed at various groups of public, including wide public (children, youth, adults, elderly, vulnerable groups of citizens) and professional public including business sector (focus on energy market and sustainable mobility), including politicians (counsellors) and city hall officials/employees. The aim is to raise knowledge, understanding, trust and commitment of public to share the ambition towards climate neutrality. Important part of it will be unified visual identity connecting municipal climate actions. This will include municipal organisations, mainly public transport provider (utilisation of bus stops and city lights for communicating the most important projects), unified visualisation of low-emission public transport fleet, in close connection to community energy concept. The aim of the identity is to share clear information to public in a way that is attractive, unified, clear, and comprehensible	10.2 10.3 1.11 1.12 4.15 4.13 8.5 8.6 8.7 8.8 8.10 8.11 9.7 10.5	engagement as private investors in various actions. • **Politicians :** there will be education focused on city councillors to strengthen their political commitment and comprehensive understanding necessary for them as decision-makers • **City hall officials/employees :** leading officials of departments and employees of relevant departments need to increase their skills and expertise linked to the climate-neutrality ambition (as operational level at the city, responsible for municipal property management, strategic planning etc.) • **Regional Office of the Liberec Region :** office is responsible for environmental public education, there are already being implemented some changes linked to the municipal ambition towards climate neutrality, but they need to be covered by	planning and climate capital planning/budgeting, i.e. overcoming the finance gap	creation ; Contribution to multi-level governance in the city ; Crucial is new way thinking about capital deployment in the city ; Positive change of the overall environment and culture across the city, mainly city hall, in case of employees and officials, including politicians, leading to bigger openness to change, innovation, new ways of thinking ; Increase in municipal (officials and politicians) capacity (in terms of expertise/capabilities)

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
			systemic comprehensive system enabling sustainable long-term activities. • **Regional Development Agency :** RDA shall be involved in public education for professional public and communication with business sector in Liberec. • **Technical University in Liberec :** local university is responsible for raising awareness and education, which provides to the university students, currently, there have been updated study programmes and syllabus of subjects with the aim to build long-term know how potential in the city and to link education more to the energy and sustainable mobility. • **Other providers of various courses as climate frisk**		
New approach to4, capital planning and funding climate actions	Since Liberec became a part of the EU Mission, there have been many changes in the whole municipal system. Beside many governance changes, there has been modified the approach how to fund municipal activities,	1.1 1.2 1.3 1.4 *1.7*	• **Finance expert** • **Climate expert/coordinator** Finance expert together with climate expert will be responsible for searching and testing new financial instruments, for raising	This innovation is crucial for implementation of the CCC Action Plan portfolio since we are aware public sources are not sufficient and	Better utilisation of available financing options Increased number of skilled jobs & rate of employment

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	mainly mitigation, adaptation, innovation activities. Until 2022, we were focused only on traditional operational programmes. Then we have learnt about other opportunities and about the necessity to use new ways of funding connected with innovative activities and projects. We applied for Horizon 2020/Europe and we are a lead partner in case of Pilot City project (Initiation of Sustainable Community Energy for the City of Liberec) and a consortium partner in the ELABORATOR project. Beside those, we are a part of two other Horizon projects (TURNAROUND MONEY, CLIMATEFIT). Furthermore, to be able to increase internal capacities, we applied to the EUCF call, which turned out to be successful and we will be able to develop investment concept for measures leading to energy savings on buildings and public lighting. We see this as a beginning, we need to test other innovative approaches, multi-source funding, various financial	*7.11* *9.5*	awareness about this approach across the city hall, shall initiate possible consortium establishment for testing such activities, will push and raise awareness about its importance among the city counsellors. • **Economic department** will cooperate with above mentioned experts closely since this department is responsible for capital planning and budgeting in the city. • **City council,** where there will be necessary to educate city counsellors appropriately to share the common vision in this field, to be willing to test new and innovative approaches and to provide them with basic background information about possibilities (at national and European level) • **Financial sector** is key stakeholders in the field of financial innovation, for example commercial banks, pension funds, EIB, etc.	we need to attract private capital and investors via various financial instruments. Successful implementation of this approach shall enable to implement more projects that would be possible from the municipal budget, i.e. leads to higher possibility of GHG reduction in the city.	Learning new approach to capital planning Increase in private investments and financial innovations. Stronger citizens' commitment via ownership (citizen capital engagement)

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
	innovations, NZC Capital Hub. We expect that many smaller steps and pilot activities should accelerate the overall municipal development in the city and the overall change within the municipal capital planning		• **Citizens,** where there in this case they represent important stakeholder with their savings (citizen capital – crowdfunding in municipal district)		
Commitment between municipality and industrial zones in Liberec	In following months, we want to move this city climate contract forward and to develop a specific commitment between municipality and industry in Liberec. There are two industrial zones in Liberec, and we want to enhance close mutual support and coordination (with help of facilitator) and to develop specific commitment between municipality and enterprises from industrial zones	1.2 1.3 6.2 6.1 10.1 10.3 1.10 6.5 6.7 6.8 10.5 10.6	• **Industrial zones** • **Denso Manufacturing Czech** (as an example of good practice, helping the city to approach other industrial enterprises**)** • **Politicians** • **Facilitator** • **Coordinator for mitigation** • **Coordinator for adaptation**	City needs to speed up green transition of local industry, to engage their capital and to support them how to change their processes towards GHG emission reduction	Increase in private investments and financial innovations. Decrease in air and noise pollution.

5 Outlook and next steps

Plans for next CCC and CCC Action Plan iteration
The City of Liberec joined the Covenant of Mayors in 2016, but no significant progress had been made towards emission reduction at that time. By 2022, when we joined the EU Mission, we were still at the early stages, although some important steps had been taken, such as preparing EPC projects, refurbishing buildings, developing community energy, decarbonizing the heating system, and testing electric buses. We began exploring possibilities for constructing renewable energy sources, mapping areas available for solar and wind power plants, and identifying opportunities and barriers for the development of electromobility within the city. These efforts marked the start of our more focused approach to achieving climate neutrality. When developing this CCC Action Plan, we utilized the current strategic documents and available data as much as possible. This Action Plan encompasses all our efforts, plans, and priorities to date and pushes them further, aiming to exceed previous ambitions by targeting an 80.7% emissions reduction compared to the 2019 baseline. In addition to other key municipal strategic documents—such as the city's master plan, the Sustainable Urban Mobility Plan, the Sustainable Energy and Climate Action Plan, and the Integrated Territorial Investments Strategy—this CCC Action Plan is anchored in the City Climate Contract Commitments. In the City Climate Contract, there id stated the goal to cut the greenhouse gas emissions by 82 % (which means cut by **596 345 t CO_{2eq}**) by successful implementation of this Action Plan by 2030, with 18 % of residual emissions to be compensated, where most will be cut in the sector of buildings, and in the sector of transport. Beside the emission reduction, there will be reached **energy savings** in the amount higher than **76,8 GWh**. Furthermore, in the Commitments part, there are defined four strategic priorities, as : - Increase in energy performance of buildings based on phasing out fossil fuels, buildings' refurbishment and energy management. - Independent, secure and self-sufficient local energy market based on renewable energy sources production and community energy sharing. - Electrification of private transport, low-emission public transport based on electrification and biogas. - Strengthening city capacity and capability, raising climate-neutrality awareness including participation, public education and facilitation, city networking and continuous learning This CCC Action Plan is fully aligned with the Commitments and elaborates them into specific pathways and actions. The range of CCC Commitments' signatories is consistent with the key stakeholders mapped in this plan. The content was developed according to the NetZeroCities template, incorporating information on the current state of climate actions, including the GHG Baseline Inventory (baseline year 2019), an analysis and assessment of existing policies and strategies at the local, regional, and national levels, and a description of the need for action. It also identifies key opportunities and barriers related to legislation, policies, and strategies at the national level. These findings are summarized in the calculation of the emissions gap for 2030. Based on the analyses, systemic barriers and opportunities for various sectors are defined, stakeholders are mapped, and the overall environment for climate actions in Liberec is described. A key part of the plan outlines pathways towards climate neutrality in line with the Theory of Change, detailing early changes, late outcomes, direct impacts, and co-benefits. The suggested pathways are further elaborated in the form of specific actions (portfolio design). Additionally, the plan includes a summary strategy for addressing residual emissions.

In the process of developing the CCC Action Plan, we have learned several important lessons that must be considered moving forward. First, there is still insufficient cooperation with the private sector, even though the importance of private resources for the successful implementation of the action plan is clear. Additionally, the current system of public participation and engagement in climate-related activities is largely ad-hoc, and we need to establish a more systemic and sustainable approach to participation, communication, and education. The most crucial insight, and a key precondition for successfully implementing the portfolio of actions, is the need to increase the city's capacity and capability. We must enhance our financial resources, knowledge, and experience, which is closely tied to an effective system of evaluation, as outlined in the MEL section above. Responsibilities for CCC evaluation and future updates or amendments have already been defined. In line with the Transition Map, the goal of this system is to continuously improve all relevant processes through assessment, learning, updating, and making these improvements the new normal.

Overall, specific milestones have been established for each action defined in this plan. **The primary challenges include bridging the financial gap and enhancing municipal capacity and capability.** Thanks to the CCC's efforts, we have strengthened or initiated numerous connections with various stakeholders at both local and national levels. We recognize the importance of supporting the Ministry for Regional Development in launching a national platform for Czech cities with the aim of initiating their green transition. Liberec aspires to become a leader in the Czech Republic, sharing best practices and experiences in strategic and capital planning, and piloting new projects focused on climate neutrality.

So far, our most significant step has been initiating relationships with key stakeholders, primarily at local and national levels. Addressing the main barriers identified in the CCC Action Plan requires effective communication with specific ministries and networking to advocate for legislative amendments that support cities pursuing climate neutrality. We have successfully initiated discussions for further support from the national level for the City of Liberec. Through the CapaCities project, we have received support from the Czech National Healthy Cities Network in areas of participation and facilitation. In terms of increasing capability, we have been assisted with technical support from the mentioned ministries, which have connected us with important national and international partners and provided valuable information. A crucial step has been strengthening cooperation with key local stakeholders. Previously, many activities were conducted in isolation; now, we are leveraging our resources and capacities to create synergies for common projects. This collaborative approach is something we need to continue and develop further in the coming months. Another important step has been the utilization of new grant schemes and programs since 2022. Traditionally, we relied on operational programs focused on investments. However, since 2022, we have begun applying for Horizon and LIFE funding, and we plan to pursue additional programs related to innovative projects. These programs offer not only funding but also technical assistance, learning opportunities, and twinning. **It can be stated that this change has transformed how we work and think about our activities and their funding, which is a crucial prerequisite for the successful further development of the city.**

As mentioned in the CCC Action Plan and the Commitments section, these documents are 'living documents' that will evolve and improve over time, with more stakeholders, including financial ones, becoming engaged.

Regarding the next steps, they can be outlined as follows. However, we expect that many activities will be clarified, discovered, specified, and completed over time as we progress towards our goals and milestones and build new relationships and knowledge.

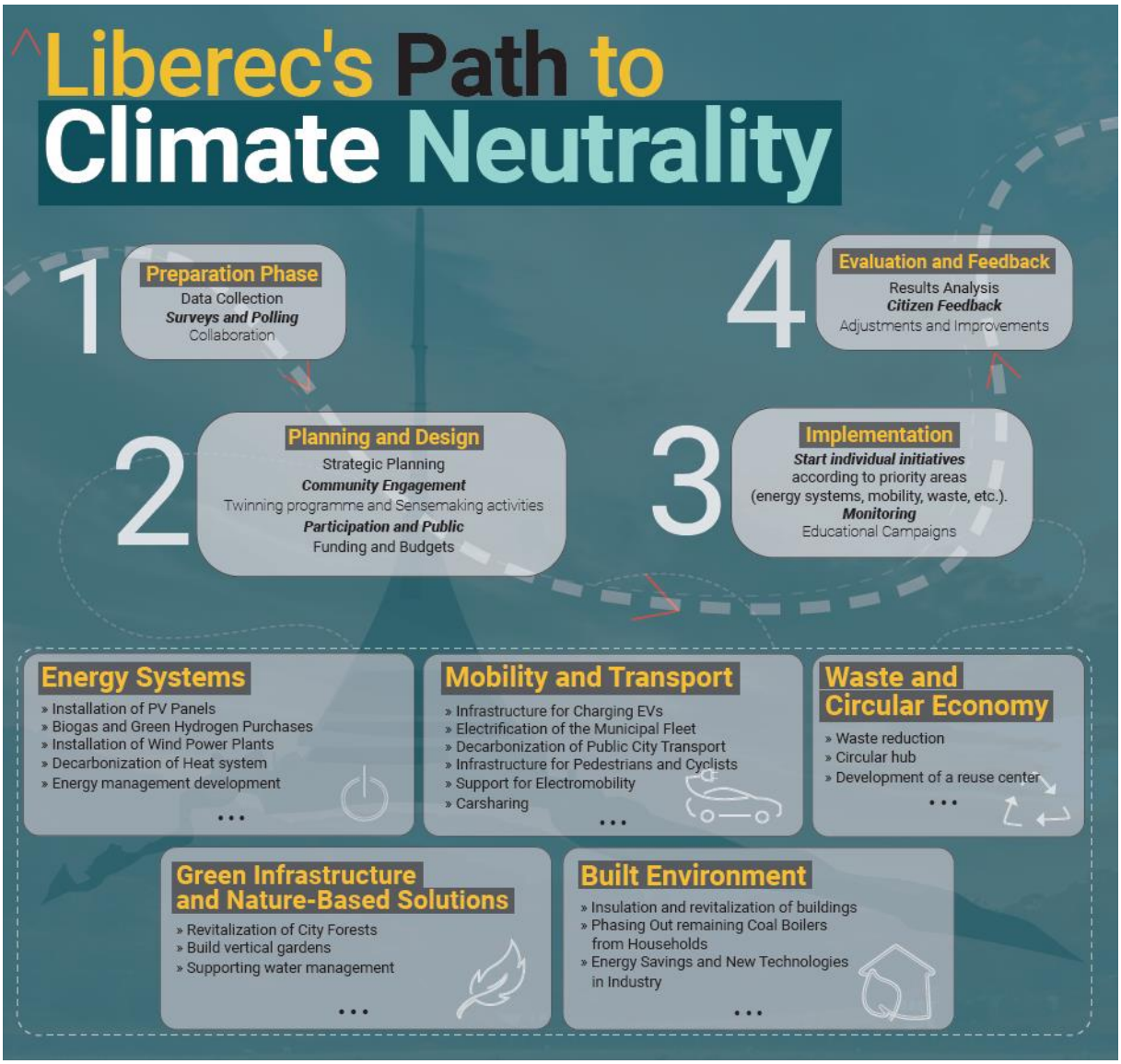
1. **Increase internal capacity and capability**, which is connected with a few milestones, closely connected to all points mentioned bellow.
2. **Strengthening/raising wide public awareness, knowledge, understanding, strengthening commonly shared vision towards climate neutrality**, which is also connected with increase in private capital/projects engagement (ongoing activity)
3. Regarding above mentioned information, important step is to **establish sustainable, long-term, comprehensive system of cooperation, public education, awareness raising,**

participation, facilitation with wide public (main focus on citizens, industry, professional public and politicians) – ongoing activity, we plan to apply for the Enabling City Transformation Call with this project, we already mapped key stakeholders for consortium establishment. Important part of that is to develop specific commitment between industrial zones in Liberec and the municipality. Furthermore, to use participatory methods to engage public in the wind power plants preparation, because in Liberec, wind power plants are not perceived positively by the public and it is necessary to work on this issue.

4. **Strengthening current cooperation with key stakeholders** in the field of common project increasing the capacity and capability, enabling reaching many synergies, building new relationships at local, national and EU level, connected with networking.
5. **Maximization of the utilization of all EU funds and national funding programmes available**, active searching for all the opportunities related to activities planned.
6. **Focus on private capital engagement** – connected to activization of key stakeholders mentioned above, mainly cooperation with two industrial zones and their activization, leading to increase in their capital involvement into climate actions. We plan to start with utilization of NZC Capital Hub (we have already prepared a project relevant, appropriate, for this assistance). Part of that is developing investment concepts for energy savings measures under the EUCF funding (2024 – 2025).
7. **Testing new financial instruments**, including NZC Capital Hub mentioned above, which is also connected with increase in (technical) knowledge in the field of developing investment plans, concepts (also with the utilization of NZC Capital Hub, PROSPECT+)
8. **Building innovative environment, piloting innovative projects.** Under this point, we aim to develop several specific activities. Given the importance of renewable energy source (RES) construction, we plan to implement a highly innovative project involving agro-photovoltaics (including retention tanks/ponds under the agro-photovoltaics on pylons) and community gardening. This project will integrate technology and social innovation and will be submitted under the European Urban Initiative – Energy Transition Call. Additionally, in spring 2025, we will explore the possibility of participating in PilotInnCities, a project led by the Ministry of Industry and Trade aimed at supporting smart cities through living labs. We are also considering various projects under Horizon calls.

All the activities mentioned above aim to support the successful implementation of actions suggested in the CCC Action Plan portfolio. Given the current state of development and our goals, we need to focus on the green transition of our local energy market, constructing renewable energy sources, phasing out remaining coal, refurbishing buildings, decarbonizing the local heating system, transitioning private and public transport to low- and zero-emission options, effective capital deployment and planning, and improving waste and public greenery management.

In conclusion, the successful implementation of this Action Plan is expected to result in a reduction of GHG emissions by 82%, equivalent to 596,345 tons CO2eq. Beyond emissions reduction, we must view the entire process as an opportunity to build a city that is sustainable, liveable, clean, and safe, while providing its citizens with excellent living conditions and improving their well-being. It is crucial to communicate this vision to the public clearly and effectively. Our goal is to become strong, sustainable, independent, and self-sufficient, to create new jobs, support local businesses and an innovative environment, and transform our perspective on opportunities and challenges. Together, we aim to drive a comprehensive behavioural change.


Liberec's Path to Climate Neutrality
1
Preparation Phase
Data Collection
Surveys and Polling
Collaboration
2
Planning and Design
Strategic Planning
Community Engagement
Twinning programme and Sensemaking activities
Participation and Public
Funding and Budgets
3
Implementation
Start individual initiatives
according to priority areas
(energy systems, mobility, waste, etc.).
Monitoring
Educational Campaigns
4
Evaluation and Feedback
Results Analysis
Citizen Feedback
Adjustments and Improvements
Energy Systems
» Installation of PV Panels
» Biogas and Green Hydrogen Purchases
» Installation of Wind Power Plants
» Decarbonization of Heat system
» Energy management development
...
Mobility and Transport
» Infrastructure for Charging EVs
» Electrification of the Municipal Fleet
» Decarbonization of Public City Transport
» Infrastructure for Pedestrians and Cyclists
» Support for Electromobility
» Carsharing
...
Waste and Circular Economy
» Waste reduction
» Circular hub
» Development of a reuse center
...
Green Infrastructure and Nature-Based Solutions
» Revitalization of City Forests
» Build vertical gardens
» Supporting water management
...
Built Environment
» Insulation and revitalization of buildings
» Phasing Out remaining Coal Boilers from Households
» Energy Savings and New Technologies in Industry
...

6 Annexes

We use the Annexes to share some pictures documenting public events and actions mentioned above in the action plan. Also, we share here the Facebook link for the Climate Neutral Liberec:

https://www.facebook.com/neutralniliberec/

1) Workshops related to the Pilot City Project the Initiation of the Sustainable Community Energy for the City of Liberec, which is a very important part of our pathway towards climate neutrality.

Workshop held at the Technical University in Liberec, November 2023

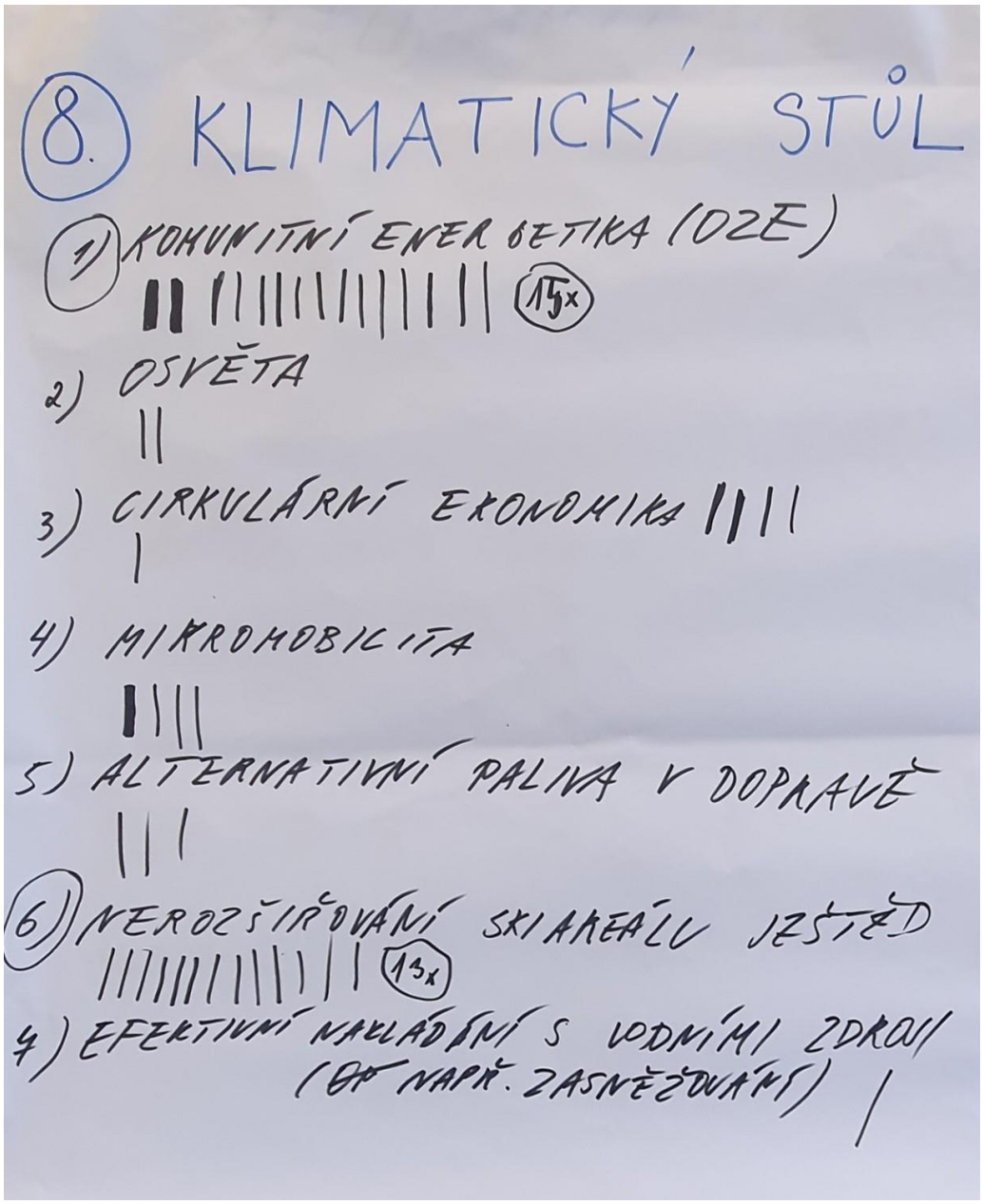
Workshop held in the city hall (City of Liberec), January 2024

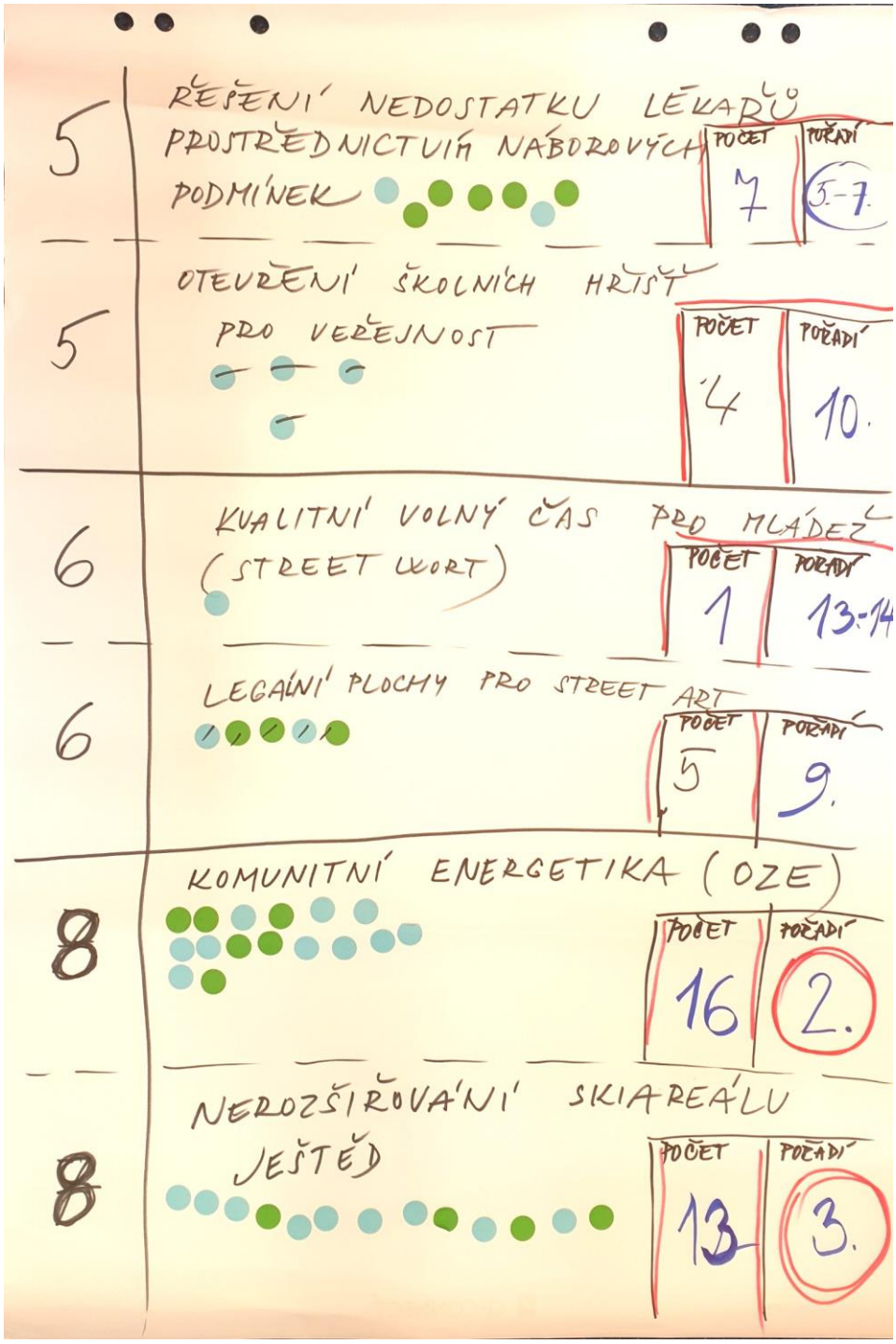
2. Meeting with ministries and other institutions regarding additional support for the city of Liberec (4/2024)

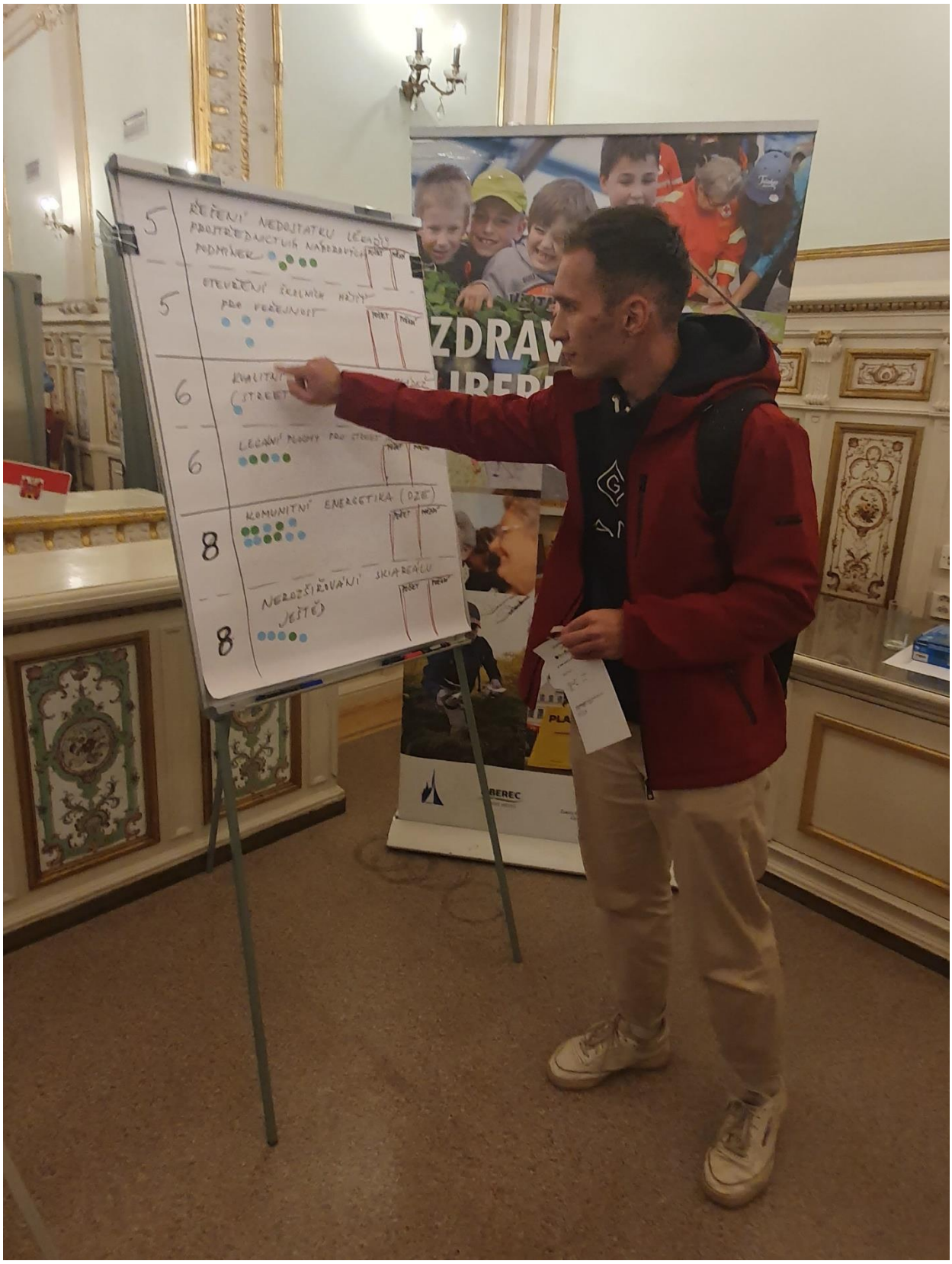
https://www.liberec.cz/cz/obcan/aktuality/zpravy-z-mesta/v-liberci-se-konalo-prulomove-setkani-k-zasadnimu-projektu-100-klimaticky-neutralnich-chytrych-mest-do-roku-2030.html

3. Roundtable for key stakeholders, professional public (climate-neutral Liberec and community energy development) in Liberec in June 2023

4. Civic forum for public in September 2023

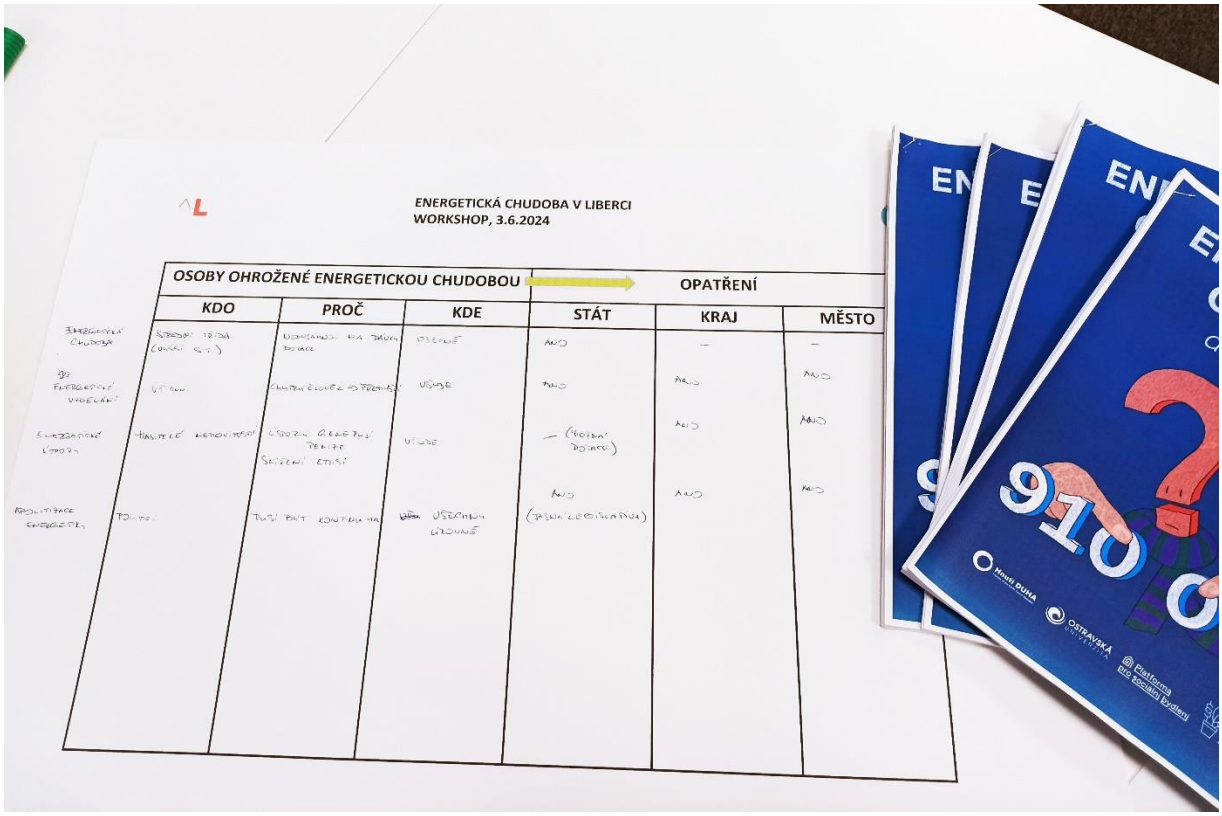

8. KLIMATICKÝ STŮL
1) KOMUNITNÍ ENERGETIKA (OZE) 15x
2) OSVĚTA
3) CIRKULÁRNÍ EKONOMIKA
4) MIKROMOBILITA
5) ALTERNATIVNÍ PALIVA V DOPRAVĚ
6) NEROZŠIŘOVÁNÍ SKIAREÁLŮ JEŠTĚD 13x
4) EFEKTIVNÍ NAKLÁDÁNÍ S VODNÍMI ZDROJI (OT NAPŘ. ZASNĚŽOVÁNÍ)


5
ŘEŠENÍ NEDOSTATKU LÉKAŘŮ PROSTŘEDNICTVÍM NÁBOROVÝCH PODMÍNEK
POČET 7
POŘADÍ 5.-7.
5
OTEVŘENÍ ŠKOLNÍCH HŘIŠŤ PRO VEŘEJNOST
POČET 4
POŘADÍ 10.
6
KVALITNÍ VOLNÝ ČAS PRO MLÁDEŽ (STREET WORT)
POČET 1
POŘADÍ 13.-14.
6
LEGÁLNÍ PLOCHY PRO STREET ART
POČET 5
POŘADÍ 9.
8
KOMUNITNÍ ENERGETIKA (OZE)
POČET 16
POŘADÍ 2.
8
NEROZŠIŘOVÁNÍ SKIAREÁLU JEŠTĚD
POČET 13
POŘADÍ 3.


5
5
6
6
8
8
KOMUNITNÍ ENERGETIKA (OZE)
NEROZŠIŘOVAT SKLÁDKU
JEŠTĚ

5. Forum for youth

6. Roundtable for public (buildings refurbishment, energy poverty, community energy) in June 2024




Město, kraj, domácnosti, podniky
ipo.lnk

7. European Mobility Week

8. Community Energy development

Energetika^Liberec

https://energetika.liberec.cz/

9. Bikesharing in Liberec

https://liberec.rozhlas.cz/sdilena-kola-se-do-liberce-vrati-v-cervnu-dostupna-budou-na-sedesati-mistech-9218740

https://liberecky.denik.cz/zpravy_region/sdilena-kola-nextbike-liberec-firma.html

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments of City of Liberec

Liberec

The content of this document reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

NetZeroCities has received funding from the H2020 Research and Innovation Programme under the grant agreement n°101036519.

Table of contents

1 Introduction

Liberec is submitting this climate contract with the ambition to become a climate-neutral, resilient, sustainable, and friendly city. We aim to collaborate with all key stakeholders across the entire city, region, the Czech Republic, and the European Union. This initiative aligns with the city's overall vision as outlined in the Master Development Strategy of the Statutory City of Liberec 2021+, stated in 2022.

"Liberec, the heart of the north, is an economic centre and a modern, innovative city which takes advantage of technological progress. It offers full-fledged housing and services, promotes an active lifestyle rich in culture and sports, and it is attractive to citizens, visitors, and employers alike. Liberec is an easily accessible, walkable, and sustainable city, surrounded by unique mountain landscapes with rich water resources. It is dedicated to air protection and prepared for climate change adaptation. Here, everyone has space for self-realization and personal development. In Liberec, the well-being of citizens and the prosperity of the city coexist in mutual harmony."

Why are we doing this?

Liberec aims to use this city climate contract to unite all key stakeholders necessary for the city's transformation. It serves as a means to facilitate and develop further cooperation and communication at all levels, leading to a commonly shared vision and increased climate actions in the city. This climate contract acts as an umbrella document incorporating all current municipal efforts, boosting them further and strengthening the city's capacity and capability to meet its goals.

The overall goal is not only connected to reducing greenhouse gas emissions, producing renewable energy, or achieving energy savings. Beyond these objectives, the main goal is to build a city that is long-term sustainable, liveable, clean, and safe, providing its citizens with good living conditions and improving their well-being over the long term. We aim to create a city that is independent and self-sufficient, generates new jobs, supports local businesses, fosters an innovative environment, and is open to change and new ways of thinking.

What is behind this commitment?

This commitment builds on the city's participation in the Covenant of Mayors initiative, which began in January 2016. The core of this initiative is to implement specific projects aimed at achieving at least a 40% reduction in CO2 emissions by 2030. A portfolio of such projects and measures is covered by the Sustainable Energy and Climate Action Plan, developed in 2018 and updated in 2022.
This action plan includes the city's previous activities, primarily focused on subsidy-funded projects aimed at energy savings in municipal buildings and some cross-border projects related to increasing climate resilience. After joining the Covenant of Mayors, the city's overall sustainability and resilience began to be more emphasized and reflected in its strategic planning. The Sustainable Energy and

Climate Action Plan was developed in 2018, followed by the Sustainable Urban Mobility Plan in 2021, which focuses on calming the city centre, reducing car traffic, and promoting active mobility and public transport. In 2022, the Local Energy Strategy was developed, a crucial document for the city's transition and acceleration of necessary changes, especially in the energy sector and buildings. This strategy also emphasizes public education and awareness, municipal management, governance, and collaboration with key stakeholders. Concurrently, EPC projects and renewable energy construction began to be actively addressed. The Adaptation Strategy was developed and approved by the city council in 2023.

Following the aforementioned milestones, the city has decided to consolidate and umbrella these partial activities and projects under the EU Mission 100 Climate-Neutral and Smart Cities by 2030. This initiative aims to declare the city's ambition to reduce greenhouse gas emissions and commit to achieving climate neutrality.

Participation in the EU Mission brings many opportunities and benefits. The NetZeroCities platform has supported the city from the beginning, providing technical and methodological assistance tailored to its specific needs. Joining the mission also offers additional funding sources and strengthens the city's capacity. Moreover, the EU Mission provides significant networking opportunities, allowing Liberec to share best practices and cooperate with various actors at local, regional, national, and European levels. As the only Czech city participating in the EU Mission, Liberec has gained high visibility in the Czech Republic, improving its public relations, and negotiating position at both regional and national levels. This visibility promotes active mutual cooperation and additional support for Liberec.

An active approach within the city's green transition will naturally lead to more effective governance, built on a multi-governance approach and participation. It creates significant opportunities for building an innovative environment in Liberec, testing pilot projects in technological and social innovation, and implementing various SMART solutions across all areas.

Shortly after joining the EU Mission, Liberec began participating in international projects funded by the Horizon Europe and Horizon 2020 programs. This demonstrates a significant shift in the city's approach to international cooperation, project funding, sharing good practices, and learning. These projects have increased the city's internal capacity, both professionally and financially, and have established new links and partnerships with various public and private sector actors.

The complete process of preparing the strategic documents, which involved analysing the existing ecosystem of the city, relevant stakeholders, opportunities, and challenges, revealed that to successfully implement the action plan and achieve the set commitments and goals, it is necessary to strengthen the city's capacity in terms of expertise and finance. Additionally, it is crucial to enhance cooperation with key stakeholders (from both the private and public sectors, at horizontal and vertical levels) based on a vision shared and accepted by all.

We believe that even the small achievements reached so far represent a significant opportunity to accelerate future development and strengthen Liberec's overall position in the Czech Republic. Liberec intends to use its success and experience to inspire other Czech cities to follow its lead in the green transition by 2050.

Please note, this commitment outlines the city's ambition, goals, and methods to achieve climate neutrality. However, it does not constitute a legally enforceable commitment, either by the EU towards the City of Liberec or by the City of Liberec towards the other signatories of this contract. The contract is prepared in accordance with the requirements and methodology of the NetZeroCities Platform and will be submitted to the European Commission for validation.

It is clear that this contract will develop and change over time. Following monitoring and evaluation, some measures may be revised, new partnerships established, and new signatories added. Therefore, this contract is created as a living document, designed to evolve, and adapt in line with the development and needs of the city.

2 Goal: Climate neutrality by 2030

This climate contract represents commitment to cut the greenhouse gas emissions by 82 % by 2030, with 18 % of residual emissions to be compensated.

The objective will be achieved through the implementation of the CCC Action Plan projects, where the portfolio of projects collectively meets the defined goal. The CCC Action Plan, which is annexed to this contract, has been prepared in full compliance with the methodology recommended by the NetZeroCities Platform. The commitment and measures cover the entire cadastral territory of the Statutory City of Liberec. The only sector not detailed in the preparation of the Action Plan is waste management. In the city's emission inventory, GHG emissions from waste are included in the buildings sector, in accordance with the recommended methodology, through the municipal waste incinerator located within the city's territory.

The sub-objectives are based on an analysis of the current situation, using both primary and secondary hard data, particularly from emission inventory outputs. It is evident that the vast majority of GHG emissions come from the buildings sector, especially households and industrial buildings. Therefore, it is essential to maximize the replacement of natural gas while increasing the consumption of electricity from renewable sources. The development of community energy will play a significant role in achieving this goal. Additionally, it is crucial to accelerate the development of low and zero-emission transport in the city. Key actions include the electrification of private transport (passenger cars and freight transport) and the electrification of public transport, in combination with biogas, supported by community energy engagement.

Cross-cutting measures related to public education and awareness-raising, aimed at promoting the desired behavioural change in society, are essential parts of our commitment. This includes establishing an effective system of cooperation and communication with all relevant actors from both the private and public sectors, at horizontal and vertical levels, and across ministries.

It is evident that new pilot solutions, innovative technologies, SMART solutions, and innovations within municipal capital planning and project financing will play a particularly important role in the entire transition process. Given the above, achieving this ambition must be interlinked to changes in municipal management and governance and its outward communications, including citizen participation.

The overall objective of this contract can be more specified, as follows:

- Total GHG emissions reduction on the cadastral are of the statutory city of Liberec by 596 345 t CO_2eq, which means 82% reduction of emissions compared to 2019.
- Offsetting residual 133 294 t CO_{2eq} GHG emission.

To achieve the long-term objective, the following medium-term objectives, which are cross-cutting and cross-departmental, need to be successfully implemented:

- To implement the CCC Action Plan portfolio projects in close coordination with the Adaptation Strategy measures and activities. This will be achieved through the cooperation of the adaptation coordinator and the EU Mission coordinator.
- To deepen links, partnerships, and mutual cooperation with all key stakeholders at local, regional, national, and European levels.
- To establish an effective and long-term system of awareness-raising and education aimed at the general public, with an emphasis on children and youth, professionals, and politicians at the municipal level, in order to strengthen comprehensive knowledge and perception of climate change issues.
- To increase municipal internal capacity, both in knowledge and finances.
- To build the innovation ecosystem in Liberec, especially in cooperation with the Technical University of Liberec, the Ministry of Industry and Trade of the Czech Republic, the Technology Agency of the Czech Republic, and the CzechInvest Agency.
- To streamline municipal governance (multi-governance, decentralization, participation) at both strategic and operational levels, fostering an organizational culture open to change, innovation, and cooperation.

The fulfilment of the objectives will also bring other co-benefits, which often cannot be quantified but play a significant role in the quality of the city, the quality of citizens' lives, and their well-being, especially:

- Reduction of air and noise pollution
- Creation of new jobs
- Contributing to behavioural change in society
- Addressing social issues and the needs of vulnerable groups
- Improving the overall perception of the city by the public, enhancing its media image and PR
- Increasing participation in all processes, establishing multi-level governance
- Enhancing the quality of public spaces (both utility and aesthetic functions)
- Overall increase in citizens' well-being. Strategic priorities

This section of the Climate Commitment defines four key priorities, areas that the city will actively focus on in the following few years. Suggested measures, projects, and activities to meet these priorities are detailed in the CCC Action Plan, which is annexed to this contract.

The strategic priorities of this commitment have been established in relation to the milestones in the process of shaping this contract, including the Action and Investment Plan. In mid-2023, the city's priorities were broadly addressed with the public. In June 2023, two roundtables were held for professionals, where the entire concept of the EU Mission was presented in the context of the city's activities and future projects. Key sectors for the city to focus on were discussed, along with potential future cooperation opportunities. Two civic forums were held in autumn 2023 to set priorities for the city's development, addressing various areas including climate neutrality and resilience.

Another key milestone for setting up strategic priorities was the development of the analytical part of the CCC Action Plan, particularly the emission inventory, which complemented data from the Sustainable Energy and Climate Action Plan. The inventory shows that the majority of greenhouse gas emissions were produced in the buildings sector, particularly within households and industry. Another sector representing a high level of GHG emissions is transport, especially concerning private passenger cars and freight transport.

Last but not least, it is essential that we commit to activities related to awareness, public education, and establishing a functional system of cooperation and communication between the private and public sectors at the city, regional, and national levels. Given the range and depth of this commitment, the city must actively engage households and the local industrial and business sectors simultaneously.

In the light of above-mentioned information, the strategic priorities were set as follows:

1. **BUILT ENVIRONMENT - Increase energy performance of buildings by phasing out fossil fuels, refurbishing buildings, and implementing effective energy management.**

- Support for complete refurbishment of buildings to improve their energy performance
- Substitution of heating sources to reduce CO2 emissions, in particular displacement of natural gas and non-renewable electricity
- Support for EPC projects, in view of above-mentioned principles
- Promote construction of new buildings in line with the implementation of the new European Energy Performance of Buildings Directive (EPBD IV) and trends in the construction industry.

2. **ENERGY - Develop an independent, secure, and self-sufficient local energy market based on renewable energy production and community energy sharing.**

- Promote production of electricity from renewable sources, building photovoltaic power plants on the buildings' roofs, including the construction of large-scale solar parks, promoting the construction of wind power plants to balance the production profile of solar power plants

- Developing the community energy in Liberec to achieve economic and social benefits as energy independence, security, and stability
- Decarbonisation of the central heating system in connection with ongoing projects of the local heating plant
- Heating sources replacement, phasing out natural gas and electricity produced from non-renewable sources
- Support of new buildings construction in accordance with new EPBD IV and current trends on construction market
- Addressing energy poverty in the city and position of vulnerable groups on the energy market.

3. **TRANSPORTATION - Promote the electrification of private transport and develop low-emission public transport based on electrification and biogas**

- Electrification of private passenger cars and freight transport, support for projects and cooperation with relevant actors creating supportive environment to achieve this goal
- Promoting low and zero emission public transport (electrification and biogas) in relation to existing EU regulation, related subsidies, and development of the community energy in Liberec.
- Promoting active mobility, welcoming public space that is safe, permeable and allows different users to coexist.

4. **CAPACITY BUILDING - Strengthen city capacity and capability by raising climate-neutrality awareness through participation, public education, facilitation, city networking, and continuous learning**

- Building internal capacities in the city, in terms of expertise of employees and officials working for the City of Liberec, while at the same time supporting and adequate structure and quality of relevant professionals/job positions in Liberec in line with current trends and labour market needs
- Increasing financial resources for the implementation of the CCC Action Plan portfolio, where the purpose is to make the city's capital planning more efficient in general, to engage private investors, to use partnerships with private sector, to test new financial instruments
- Address systematically awareness and information in areas related to climate change, across the city, within the municipality, at the political and operational level, in the case of professional public and citizens, civic society as well.

3 Process and principles

Liberec undertakes the entire process of fulfilling the obligations defined in this contract with reflect following key principles:

- **Climate Justice**

Within the local context, it is necessary to ensure education is accessible to all, taking into account vulnerable groups, providing equal access to education, addressing energy poverty, and preventing related social risks.

- **Transparency**

The entire process is fully transparent, with all documents published, including regular evaluations of progress. The wide public will be engaged in the process of any future amendments and changes toward the established goals.

- **Building and inclusive city ecosystem**

It is necessary to build a functional city ecosystem based on multi-level governance and participation (co-creation) of all key stakeholders, including citizens, to contribute to a shared vision and its active support. An integral part of this is more coherent, targeted cooperation at the regional and national levels, promoting Liberec as a regional capital city and the only Czech city participating in the EU mission. This approach will also position Liberec as an innovative, experimental centre in the field of GHG reduction, allowing it to share experiences, knowledge, and results with other Czech cities.

- **Coordination of the climate commitment and the adaptation strategy commitment**

The climate contract and related portfolio of projects primarily focus on mitigation measures, but these must be addressed in a coherent and coordinated manner with adaptation measures to increase the climate resilience of the city.

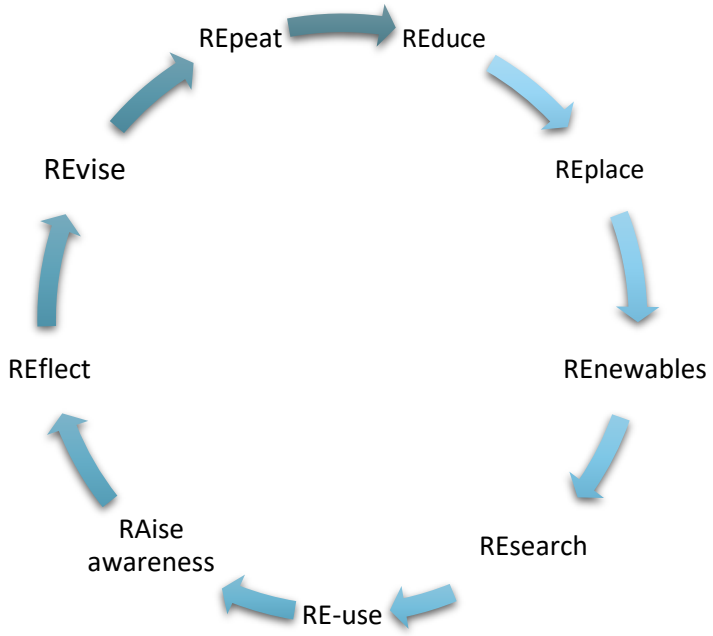
- **Support for innovation, pilot projects and SMART solutions**

Liberec aims to build an innovative environment in the city to test and introduce new technological and social innovations and solutions that fulfil the Smart City concept. To achieve this, it is necessary to cooperate with key stakeholders, including institutions involved in supporting research, development, and innovations, the Ministry of Industry and Trade, innovative start-ups, industrial enterprises in the city, and other Czech and European cities through joint projects.

- **Continuous learning system based on regular monitoring and evaluation**

The purpose is to continuously improve the entire transition process, which we see as a constantly repeating cycle. This will lead to the gradual incorporation of new activities, approaches, technologies, and solutions into the city's standard processes, making them the new normal.

With regard to above mentioned principles, goals, and content of the CCC Action Plan, the entire process – cycle – and important milestones of the transition can be visualized as follows:



The whole cycle and process of the city's green transition are built on several elements, none of which has more weight or priority; all of them must be implemented simultaneously and continuously. The points summarize the implementation and focus of the CCC Action Plan (reduce, replace, renewables, research, re-use, raise awareness), including monitoring, evaluation, a learning process, and revision of existing measures (reflect, revise, repeat).

Taking into account the current situation in the city (the city's emission inventory and the measures set in the action plan), it is clear that it is necessary to improve the energy performance of buildings and lead society in general towards responsible and sustainable energy management in everyday processes, including sustainable consumption (REDUCE). At the same time, it is necessary to replace fossil fuels with renewable energy sources, whether in buildings or in low/zero-emission transport. In particular, natural gas must be displaced from the buildings sector and diesel from the transport sector

(REPLACE). Fossil fuels must be replaced by renewable energy sources, including wind energy in addition to solar energy (RENEWABLES), to achieve a balanced production profile in relation to our commitment level. Liberec will support the city's innovation environment to test and apply innovative technologies and solutions, cooperate with all key stakeholders, and actively participate in international projects (RESEARCH). At the same time, we need to focus on the circular economy, sustainable consumption, and efficient waste management (REUSE).

A key part of the complete process is to inform and educate, sharing experiences and good practices to promote the most desirable society-wide change in this area. This will impact daily decision-making processes and choices in a more sustainable direction, leading to behavioural change. In addition to the residents, it is equally necessary to continuously educate politicians, employees, and city officials to make decisions and take actions based on comprehensive and quality information. Full understanding of the entire system reinforces the city's shared ambition and commitment to climate neutrality (RAISE AWARENESS).

An integral feature of the city's transition is the cyclical process based on continuous monitoring, evaluation, and subsequent revision of measures and activities to meet the city's goals (REFLECT). It can be summarized as an ongoing cycle based on the implementation of the CCC Action Plan, reflection on achieved milestones, new challenges, threats, and opportunities, and the process of learning to make it the new normal (REPEAT)

4 Signatories

Name of the signatory (organisation)	Sector / Domain / Level of operation	Legal form	Name of the responsible person	Position of the responsible person
Agentura pro podporu podnikání a investic CzechInvest	Business and investments support /national level	State contributory organisation	Please note that the CCC Commitment is undergoing legal review by the organisation, but we expect this agency to join this commitment and to the attach it as soon as possible	
ARR – Agentura regionálního rozvoje	Regional organisation providing technical and expert assistance for municipalities/regional level	Limited liability company	Petr Dobrovský	Managing Director
Člověk v tísni	Support for civil society, combatting poverty, social work/international level	Non-profit organisation	Lukáš Průcha	Director of the Regional Office
Denso Manufacturing Czech	Industry/Local level	Limited liability company	Akihiko Kakiuchi Ing. Filip Valenta Ing. Radim Tanzyna	President of the Company Head of Function Unit – Quality & Engineering Carbon Neutral Leader
Dopravní podnik měst Liberec a Jablonec nad Nisou	Public transport provider/local level	Joint stock company	Ludvík Lavička	Chief Operating Officer
Krajská nemocnice Liberec	Regional hospital and the largest employer in the city/regional level	Joint stock company	MUDr. Richard Lukáš Ph D.	CEO, Chairman of the Board
LEEF Technologies	Consulting company and project partner of the city (energy, electromobility)/national level	Limited liability company	Martin Cmíral	Managing Director
Liberecký kraj	Regional Office of the Liberec Region (higher authority)/regional level	Higher self-governing territorial unit (region)	Martin Půta	Governor of the Liberec Region
Local Commissions	Citizens/local level	Municipal advisory bodies	In Liberec, there have been replaced former local committees by the local commissions. When all local	

Name of the signatory (organisation)	Sector / Domain / Level of operation	Legal form	Name of the responsible person	Position of the responsible person
			commissions will be established officially, we can discuss their commitments.	
Městské lesy Liberec	Municipal forest management/local level	Municipal contributory organisation	Bc. Jiří Bliml	Managing Director
Ministerstvo pro místní rozvoj ČR	Ministry for the Regional Development; central state administrative authority in regional development affairs/national level	Central government authority	Ing. Lukáš Černohorský	Deputy of the Cabinet Minister
Ministerstvo životního prostředí ČR	Ministry of the Environment; central state administrative authority in environmental affairs/national level	Central government authority	Mgr. Petr Hladík	Minister
Národní síť Zdravých měst ČR	National association of Czech municipalities and regions providing facilitation, sharing CEO, Chairman of the Board best practice and exchange/national level	Interest association of legal persons	Ing. Petr Švec	Managing Director
SBD Pozemní stavby	Housing cooperative owning/managing around 7000 housing units in the Liberec Region/regional level	Housing cooperative	Ing. Dalibor Hampejs Michal Vlach	Vice-Chairman of the Board of Directors Vice-Chairman of the Board of Directors
SBD Sever	Housing cooperative owning/managing around 10000 housing units in the Liberec region/regional level	Housing cooperative	Ing. Mgr. Petr Černý, MBA Michal Bezucha	Chairman of the Board of Directors and Managing Director; Member of the Board of Directors
Sdružení TULIPAN	NGO working with people with disabilities (vulnerable groups of citizens)/regional level	Registered association	Mgr. Zora Machartová	Managing Director

Name of the signatory (organisation)	Sector / Domain / Level of operation	Legal form	Name of the responsible person	Position of the responsible person
Spolek pro estetiku veřejného prostoru	NGO involved with aesthetics of public space in the city/local level	Registered association	Jindřich Gubiš	President of the association
Statutární město Liberec	Municipality/all domains/local level	Municipality	Ing. Jaroslav Zámečník, CSc.	Mayor of the City
Technická univerzita v Liberci	Regional university based in the city of Liberec, educational, research and innovation centre in Liberec/regional level	Research organisation	doc. RNDr. Miroslav Brzezina, CSc., dr. h. c.	Rector of the University
Technické služby města Liberec	Municipal organisation responsible for public space maintenance/local level	Municipal contributory organisation	Ing. Jan Ullmann	Managing Director
Teplárna Liberec	Heating plant/local level	Joint stock company	Ing. Jan Sedláček Ing. Petr Boukal	Chairman of the Board of Directors Vice-Chairman of the Board of Directors