

Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan of Espoo



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Summary

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

Textual element

As one of the 100 Climate-Neutral and Smart Cities in the EU Mission, Espoo is leading the city-wide transformation towards climate-neutrality by 2030.

Espoo's Climate City Contract identifies a portfolio of actions by the city and its stakeholders, impact pathways and investment plan in five focus areas: energy, transport and mobility, circular economy and sustainable lifestyle, land use and construction, and nature and biodiversity.

The city has called upon a wide range of partners representing business, academia and research and education sectors to join the work with their own commitments and action. By September 15, 2023, the Climate City Commitment has been signed by 22 stakeholders, and we are welcoming others to join later with their own climate commitments to reach the city's ambitious climate goal.

1 Introduction

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

Introduction - textual element

Espoo is an innovation city committed to ambitious sustainability goals and inclusive city development. As Finland's second largest city, Espoo is one of the key actors contributing to regional and national targets of climate neutral Helsinki-Uusimaa region by 2030 and climate neutral Finland by 2035.

Espoo has grown and continues to grow faster than any other city in Finland facing a challenge of keeping the city growth sustainable. Despite the fast population growth, Espoo has already managed to start reducing not only the CO₂ emission per capita, but also its total emissions, and has adopted ambitious measures to continue the reductions at an increasing pace.

Espoo's Climate City Contract identifies a portfolio of actions by the city and its stakeholders, impact pathways and investment plan in five focus areas: energy, transport and mobility, circular economy and sustainable lifestyle, land use and construction, and nature and biodiversity. Measures aimed at reducing electricity consumption, district heating and traffic emissions are the most critical. Transportation currently accounts for a third of CO₂ emissions in Espoo, and with the rapid decarbonization of the energy production, the share is estimated to rise to 55 % by 2030.

Espoo's approach to sustainability and climate action is to look for integrated solutions considering simultaneously the systemic effects on ecological, social, and economic sustainability. The 17 UN Sustainable development goals - including SDG13 climate action - provide us a framework to understand the highly interconnected aspects of sustainability. Espoo was one of the first cities to conduct Agenda 2030 Voluntary Local Review (VLR) in 2020 with more than 1,000 people participating in assessing the city's sustainability performance. This highlighted the interconnectedness of climate goals to other aspects of sustainability and the need to just transition in the spirit of « leaving no one behind ».

Espoo has been systemically working on climate issues for 15 years. In 2010, the city joined the Covenant of Mayors, and at that time, set the goal of reducing greenhouse gas emissions per capita by 28% from the 1990 level by 2020. This goal was already achieved in 2016. In 2017 the City Council set the ambitious goal of making the city climate-neutral by 2030. Next year Espoo joined the updated Covenant of Mayors and prepared Sustainable Energy and Climate Action Plan (SECAP) as the key instrument for implementing the agreement. SECAP outlined the key measures the city will take to achieve its climate-neutrality goal. The plan also includes a mapping of climate change risks and vulnerabilities, adaptation measures, emission calculations, emission reduction scenarios and impact estimations of measures.

The commitment to climate-neutrality holds strong in the new Espoo Story, the city's strategy, approved by the City Council in 2021 outlining climate-neutrality by 2030 as one of the seven key targets for the whole city organisation for the council term 2021-2025. Its implementation is supported by Sustainable Espoo Programme, a strategic cross-sectoral programme owned by the mayor and led by a high-level steering group to lead long-term, goal-oriented systemic development towards a climate-neutral city. To deliver these goals, Espoo is co-operating with universities, research organisations, innovation actors, businesses, and citizens to produce innovative solutions that cut down emissions in Espoo and have a positive carbon handprint. Espoo has included climate action in the strategic agreements signed with local stakeholders to get the whole community behind commonly shared goals.

Espoo's Climate City Contract has been built upon this background of orchestrating a climate neutral and smart city in a multilevel collaboration. The climate action portfolio builds upon the actions identified in SECAP and Sustainable Espoo Programme. New scenarios that identify possible pathways to climate-neutral city have been developed during the process of preparing the Climate

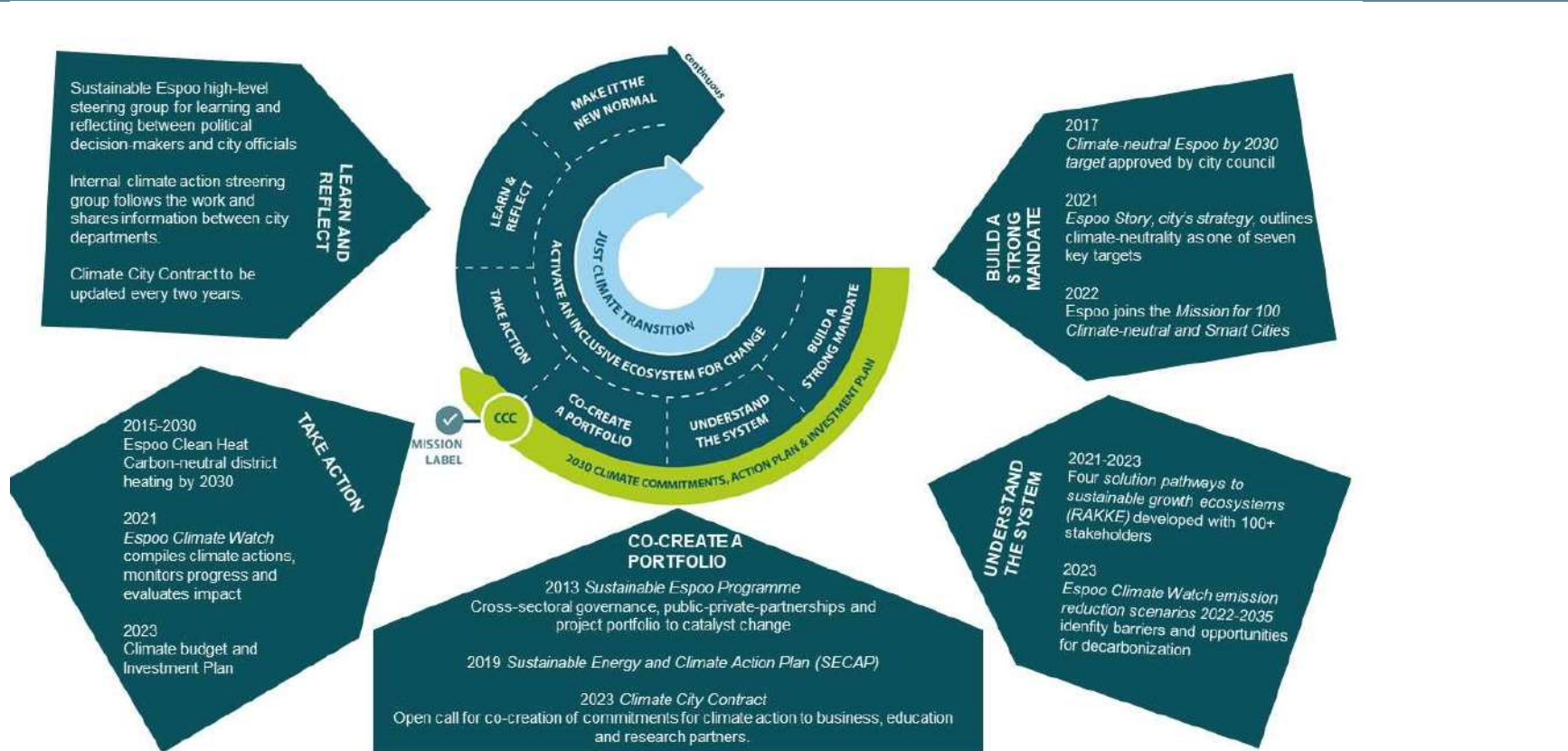


City Contract. Climate budget and investment plan as well as city-wide roadmap to climate-neutrality are being developed in collaboration with different departments of city organisation as well as the innovation community, private sector, third sector and citizens. The city has called upon a wide range of partners representing business, academia and research and education sectors to join the work with their own commitments and action. To succeed in the ambitious goal of climate-neutrality, Espoo needs to engage whole community in finding new technological, nature-based, governance, and social innovation solutions. Therefore, co-creation, collaboration and innovation are at the heart of Espoo's Climate City Contract.



2 Work Process

Work Process - combination of textual and visual elements



Espoo's CCC process builds upon existing strategies, commitments, and programmes and aims at activating an inclusive ecosystem for rapid decarbonization. The process has been described in more detail in Espoo's Climate Neutrality Commitment section 4: Principles and Process. The work is ongoing, and the transition map will be further developed in the next stages of the process.

3 Part A – Current State of Climate Action

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

3.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

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

A-1.1: Final energy use by source sectors				
Note: The methodology used for calculations is described in section A-1.6: <i>Description and assessment of GHG baseline inventory and emissions gap calculations</i>				
Base year	2022			
Unit	GWh/year, including housing and other buildings			
	Scope 1	Scope 2	Scope 3	Total
Buildings, heating				
District heating, incl. Coal, natural gas, oil, bio and heat pumps		1958		1958
Oil heating	166			166
Electricity heating		394		394
Electricity consumed		1701		1701
Transport				
Fossil fuels	1455			1455
Fossil fuels, industrial and machinery	50			50
Waste				
Data not available				
Industrial Process and Product Use (IPPU)				
There is no significant manufacturing industry in city of Espoo. Not relevant.				
Agricultural, Forestry and Land Use (AFOLU)				
Data not available. In Espoo there is no significant agriculture.				



A-1.2: Emission factors applied

The calculation of greenhouse gas emissions is based on the international city level Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC). It is based on the methodology and calculation parameters of the IPCC national emission inventories and the emission factors of Statistics Finland's Fuel Classification.

The emissions calculation takes into account the three main greenhouse gases: carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). The results are expressed in terms of CO₂ equivalents, where methane and nitrous oxide emissions are converted into a quantity of CO₂ equivalent to their global warming potential and added to the CO₂ emissions. In addition F-gases are manually added to mission calculations from [SYKE's data \(Finnish Environment Institute\)](#). Therefore we do not have the information of the distribution of emissions between different gases. The access to this data is a need for future improvement.

More detailed methodology is described in section *A-1.6: Description and assessment of GHG baseline inventory and emissions gap calculations*.

Primary energy/ energy/ source	Carbon Dioxide (CO ₂)	Methane (CH ₄)	Nitrous Oxide (N ₂ O)	F-gases (hydrofluoro carbons and perfluorocar bons)	Sulphur hexafluorid e (SF ₆)	Nitrogen trifluoride (NF ₃)

A-1.3: Activity by source sectors, metric tonnes CO₂e based on CDP-ICLEI and GWh based on local calculation

Base year		2022		
		Scope 1	Scope 2	Scope 3
Buildings (GWh)			5724	
Housing			3065	
Services			1928	
Industry			731	
Transport (metric tonnes CO₂e)		300	3	
Private cars (electric vehicles electricity use not included in buildings energy)		172		
Motorcycles		6		
Van		26		
Truck		82		
Bus		5		
Commuter train			2	
Metro			1	
Cargo ships			0	
Leisure boat		6		
Professional boat		2		
Passanger Ship			0	
Waste (metric tonnes CO₂e)		19	0	3
Landfill	Housing			1

Landfill	Services			1
Landfill	Industry			1
Biowaste composting	Housing	1		
Biowaste composting	Services	1		
Biowaste composting	Industry	1		
Waste water treatment	Housing	6		
Waste water treatment	Services	4		
Waste water treatment	Industry	2		
sewage sludge treatment	Housing	2		
sewage sludge treatment	Services	1		
sewage sludge treatment	Industry	1		
Industrial Process and Product Use (IPPU) There is no significant manufacturing industry in city of Espoo				
Agricultural, Forestry and Land Use (AFOLU) (metric tonnes CO ₂ e) (In Espoo there is no significant agriculture)		1		
Fields		1		
Domestical animals		0		

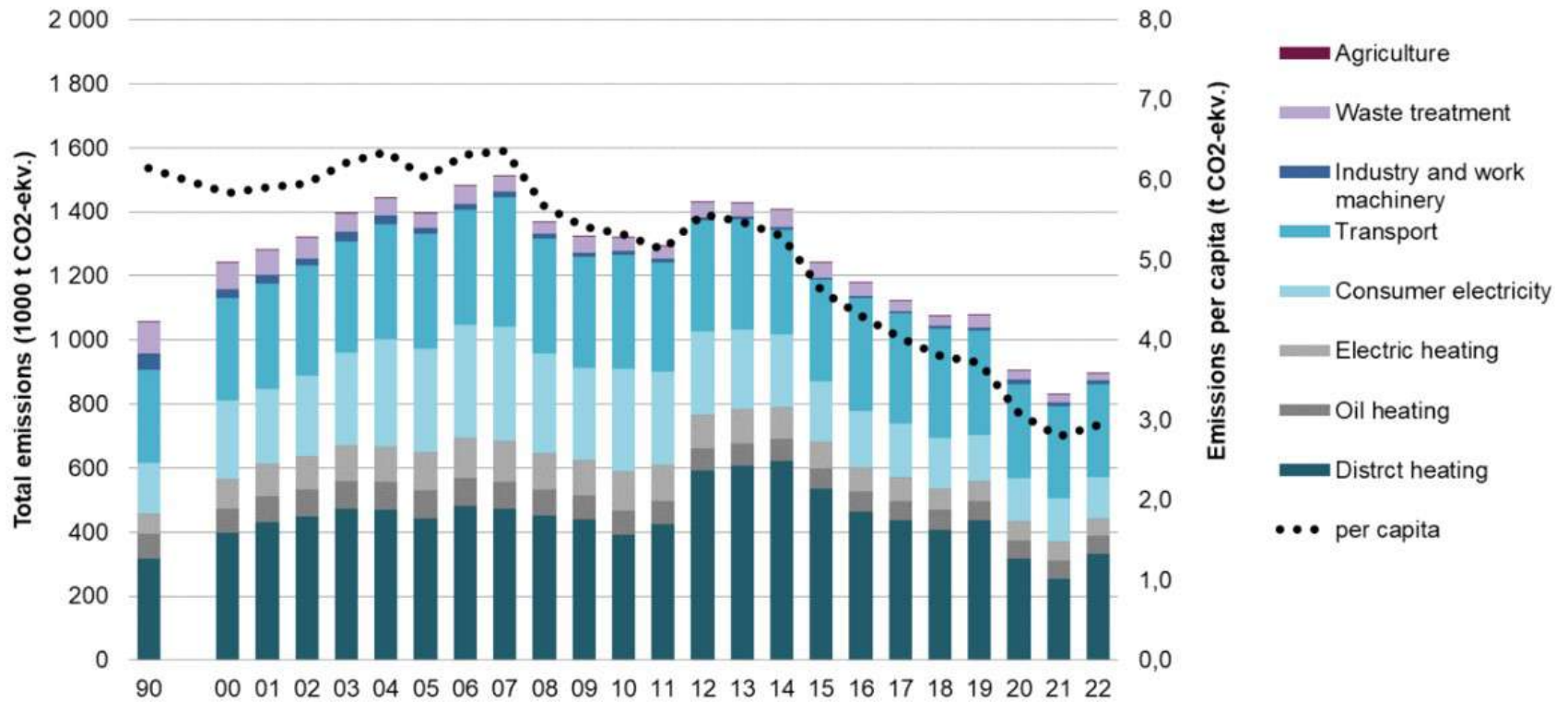
A-1.4: GHG emissions by source sectors, based on CDP-ICLEI.

Base year	2022			
Unit	1000t CO ₂ equivalent/year			
	Scope 1	Scope 2	Scope 3	Total
Buildings/Heating and electricity	62	516		578
Transport (electric vehicles electricity use is in electricity)	300	3		303
Waste	19		3	22
Industrial Process and Product Use (IPPU)				
F-gases	34			34
Agricultural, Forestry and Land Use (AFOLU)	1			1
Total	416	519	3	938



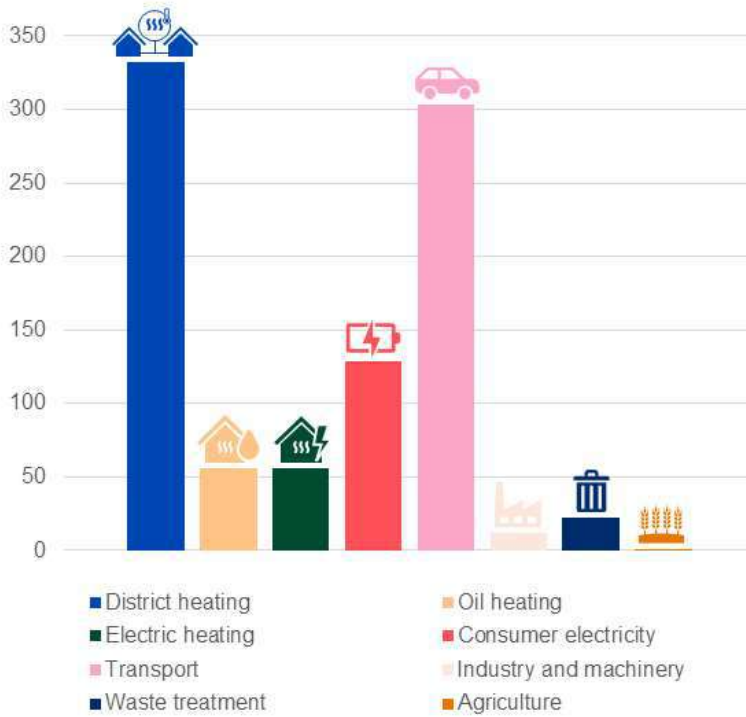
A-1.5: Graphics and charts

Espoo greenhouse gas emissions 1990 and 2000–2022



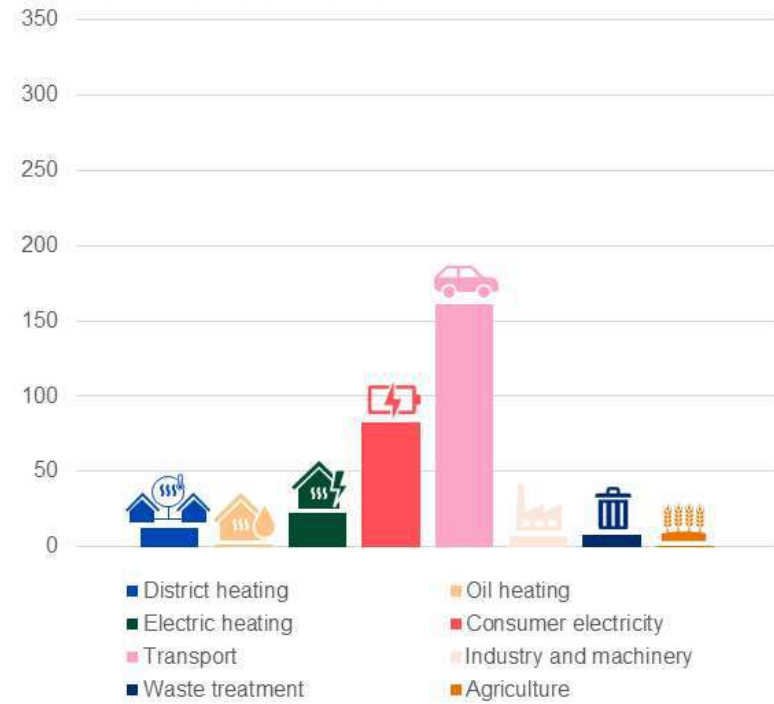


Distribution of GHG emissions in Espoo 2022



Source: Greenhouse emissions in the Helsinki metropolitan area HSY 2023

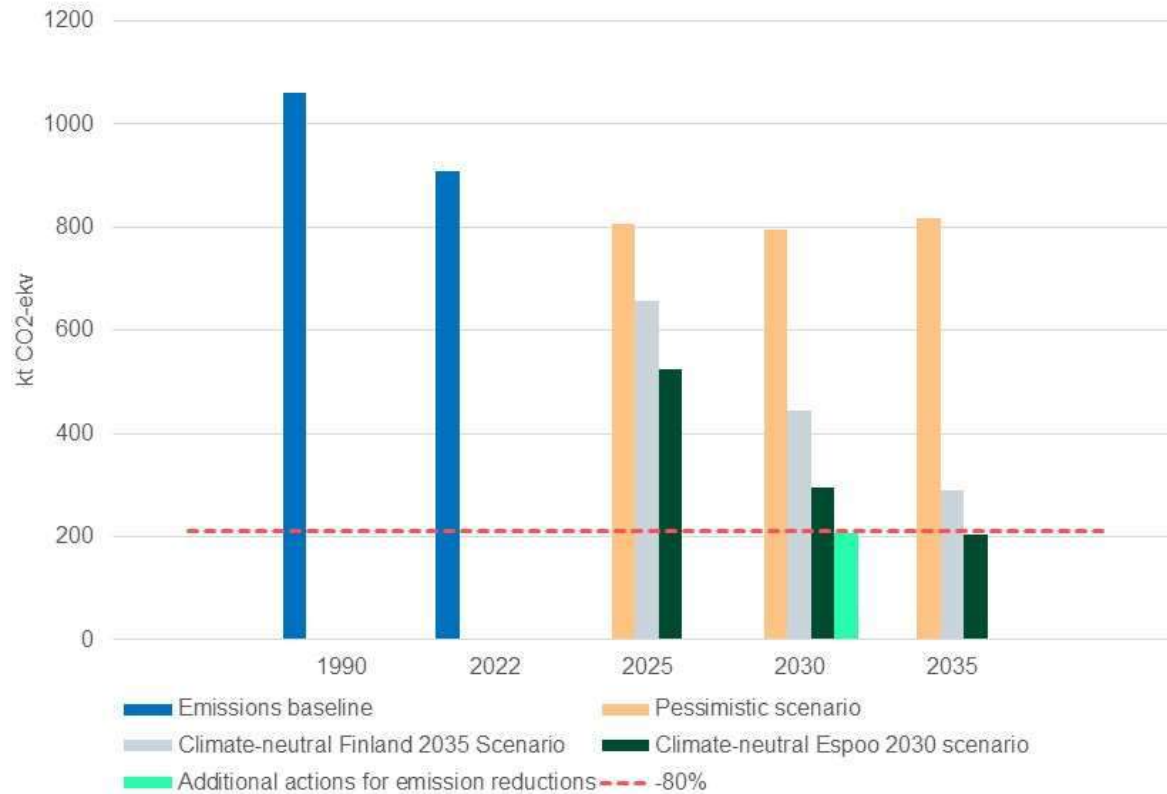
**Distribution of GHG emissions in Espoo 2030
Climate-neutral Espoo scenario**



Lähde: City of Espoo Future Emission Reduction Scenarios, Sitowise 2023



GHG Emission reduction scenarios 2025, 2030 ja 2035



Pessimistic scenario that assumes no new emission reduction measures are planned or implemented in the city. In this scenario, the city's emissions performance is affected by factors such as the city's growing population.

Climate-neutral Finland 2035 scenario that assumes Espoo's emissions development will be affected by climate policy measures and policies at national level. The scenario also takes into account the growth of the city and the impact of EU legislation.

Climate-neutral Espoo 2030 scenario that assumes the city's emissions development is influenced not only by national policies but also by climate actions taken by the city and its partners, such as Fortum and HSY.

Additional actions that have been identified during the CCC process and show the potential for reaching the climate-neutrality goal by 2030. The implementation of these actions has not yet been agreed upon in the city's political decision-making process.

(Sitowise 2023)

A-1.6: Description and assessment of GHG baseline inventory and emissions gap calculations**Trend of GHG emissions in Espoo**

Espoo's emissions per capita have been decreasing since 2008 and, compared to year 1990, were halved for the first time in 2020. Fast population growth poses a challenge to cutting down total emissions, but investments in low-carbon energy production have turned the curve down since 2012. The most rapid positive changes have occurred in district heating. In 2022, the emission per capita were the lowest in the Helsinki Metropolitan Area for the seventh consecutive year, 2.9 tonnes CO₂ eq. Due to the city growing, Espoo's total emissions (897 kt in 2022) are however still long way from the city's climate-neutrality goal. Therefore, ambitious climate actions, especially in the domains of electricity consumption, district heating and transport, are still needed. Since 1990, total emissions have decreased by 15 %.

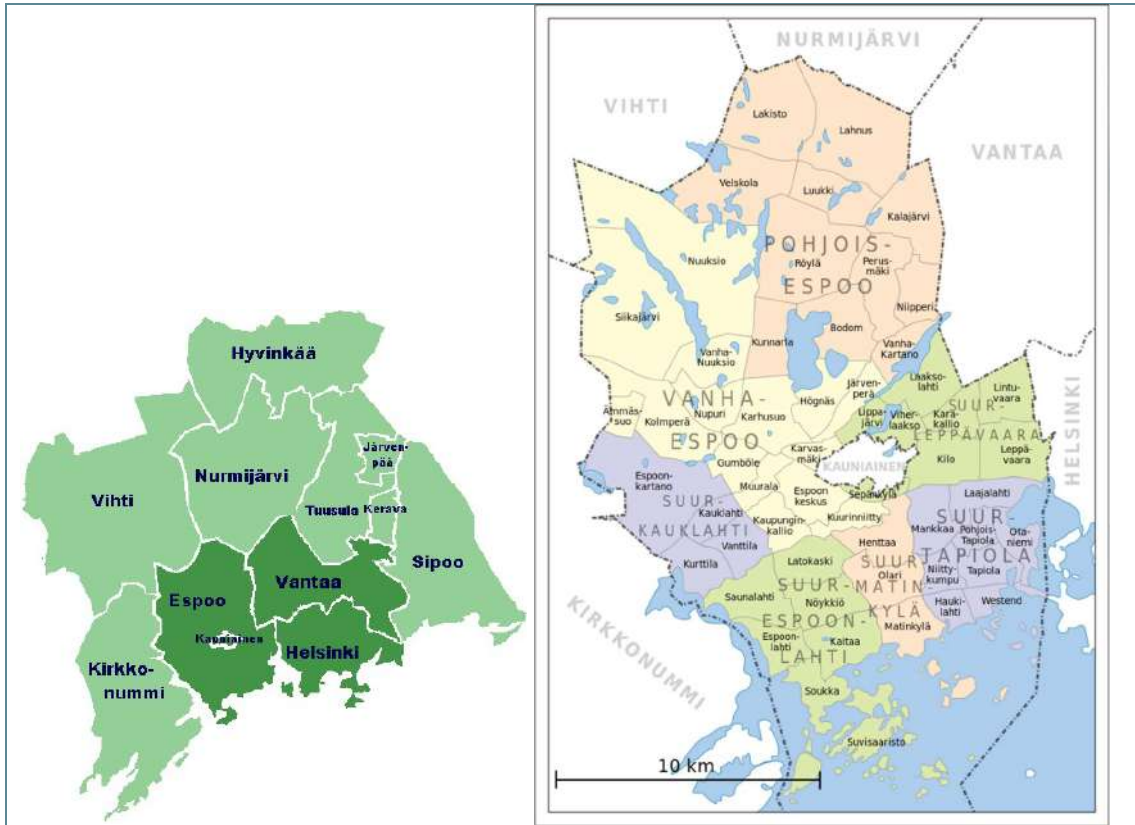
In 2022, the energy crisis caused by Russian's war of aggression against Ukraine increased Espoo's emissions compared to the previous year by 8 % for the first time in 10 years. The temporary increase in emissions was caused by the district heat emissions increasing by 30 per cent from the previous year, which in turn was caused by the end of natural gas imports from Russia. This led to a situation where energy production purchases were primarily driven by price and availability. In district heat production, natural gas was replaced with other fossil fuels increasing the heating emissions.

After heating, the largest sources of greenhouse gas emissions are electricity consumption and traffic. The overall consumption of electricity decreased by about one per cent and electricity consumption in housing decreased by as much as seven per cent compared to 2021. Electricity consumption in electric heating, services and industry increased by two to three per cent. The decrease in electricity consumption in housing is largely due to the high price of electricity and the successful campaigns that encouraged residents to reduce their consumption.

Geographical boundaries

Espoo's emission calculations include the whole city geographic area. The city covers 528 km² with a land area of 312 km², 58 kilometres of coastline, 165 islands, 100 lakes and Nuuksio national park in northern Espoo. Forests occupy nearly 60% (18,700 ha) of Espoo's land mass. Of these, a relative large proportion, some 2,300 hectares, is protected.

With a population of 305 274 (2022) Espoo is the second most populous city in Finland. Espoo is a network city with five urban centres connected by rails. Tapiola, Matinkylä-Olari and Espoonlahti are located by the West Metro, and Leppävaara and Espoon keskus by the City Rail Link. Increasing the efficiency of cross-town transport services in the capital region, the Jokeri Light Rail line will connect the metro and the City Rail Link in 2024. Rails also connect Espoo to other parts of Helsinki Metropolitan area.



Greenhouse gas emissions calculation method of the baseline inventory

The calculation of greenhouse gas emissions in the metropolitan area is based on the international [city-level calculation standard Global Protocol for Community-Scale Greenhouse Gas Emission Inventories \(GPC\)](#). It is based on the methodology and calculation parameters of [the IPCC national emission inventories](#) and the [emission factors of Statistics Finland's fuel classification](#).

The emissions calculation takes into account the three main greenhouse gases: carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). The results are expressed in terms of CO₂ equivalents, where methane and nitrous oxide emissions are converted into a quantity of CO₂ equivalent to their global warming potential and added to the CO₂ emissions.

The focus of the calculation is on the greenhouse gas emissions from energy consumption. The inventory includes emissions from the following activities in the metropolitan area: heating of buildings, electricity consumption, transport (cars, ports, local trains, trams and metros), waste and waste water treatment, agriculture, and process emissions and fuels from industry and machinery.

The scope of the calculation is GPC scope 2 (energy emissions are calculated on a consumption basis; national grid electricity). Air transport, shipping outside ports and adjacent areas, and indirect emissions from food production and the manufacture of consumer goods (scope 3) are not included in the metropolitan area data and Espoo is calculating them separately.

The scope 1 and 2 calculation model was developed for the emissions calculations of the Helsinki Metropolitan Area Climate Strategy 2030 in 2007, based on the Kasvener model of SYKE and the Association of Finnish Municipalities. After the publication of the strategy, the calculation was further modified with regard to the calculation of the national emission factor for electric heating and electricity consumption. After the name of the Climate Strategy Steering Group, the method has been called the Hilma model.

In 2016, the Hilma model was further developed for the emission factors for electricity, heating and heating energy consumption, non-road machinery and waste management. Emissions from agriculture and composting continue to be calculated using Kasvener.

Greenhouse gas emissions for the previous year for municipalities in the metropolitan area will be published in the spring when the final data for road transport are available. This preliminary data will be supplemented slightly during the year so that the final results will be updated in the following year's reporting.

Main principles of the calculation

Heating of buildings

- Heating of buildings is divided into district heating, oil heating, electric heating and geothermal heating.
- Emissions from cogeneration (CHP) are calculated using a benefit-sharing method, where the benefits of cogeneration are allocated to each energy product. The fuels and emissions of cogeneration are allocated to electricity and heat in proportion to the fuel consumption of their alternative sources.
- Heating energy consumption is considered as a five-year rolling average, no heat value adjustment is used.
- The energy consumption of individual heating (other than district heating) is estimated on the basis of the number of square metres of floor area and the heating demand for each year, as provided by Statistics Finland's building stock statistics.

PRIMARY DETERMINATION

Separately heated floor square metres; data from the previous year are used.

FINAL DATA

- Building stock statistics
- Electricity emission factors

Electricity consumption

- Electricity consumption is divided into electricity for heating (electric heating and geothermal heating) and electricity for consumption.
- Emissions are calculated using the national emission factor. The factor is calculated by dividing the emissions from electricity production in Finland by total consumption. Imported electricity is considered emission-free.
- A separate emission factor is calculated for heating electricity, which is higher than other electricity consumption. Until 2005, the factor was constant, after which it was calculated to change in line with the emissions from total electricity consumption in Finland.

PREVIOUS DATA

- Emissions from electricity generation in Finland using the benefit-sharing method; estimated on the basis of emission data calculated using the energy method and historical data.
- Share of heating electricity in Finland's electricity consumption estimated on the basis of historical data.

FINAL DATA

- Statistics Finland's data on emissions from electricity generation in Finland using the benefit-sharing method
- Heating electricity consumption (housing)

Transport

- Road transport emissions within municipal boundaries by vehicle and road type from VTT's Lipasto system.
- Electricity consumption of commuter trains is allocated to rail municipalities on the basis of population. The emissions of rail transport (commuter trains, metro, trams) are calculated using the emission factor for electricity consumption.
- For port emissions, Port of Helsinki's own calculation is used and emissions from small boats are calculated using the Lipasto calculation model based on Trafi's registration data.

PREVIOUS DATA

- Electricity consumption of commuter trains; data from the previous year are used.

FINAL DATA

- Commuter trains
- Electricity emission factors

Industry and machinery, included in transport sector

- Data on industrial fuel use from VAHTI.
- In addition, "excess" light fuel oil is calculated; the estimated consumption of oil heating and industrial light fuel oil consumption is subtracted from the amount sold in the municipality during the year.
- As regards machinery, all petrol-powered machinery is taken into account, except snowmobiles and professional ATVs and chainsaws and bushcutters. Emissions from the national TYKO database based on population for municipalities.

PRIMARY DATA

- Industrial fuels; data from the previous year are used.

FINAL DATA

- Watch figures
- Other light fuel oil; consumption for oil heating

Waste management

- Emission data for landfill and waste water treatment are obtained directly from the installations.
- Emissions from biowaste and sludge composting are calculated by Kasvener.
- Emissions from power generation at waste water treatment plants are included in the waste treatment emissions.

Agriculture

- Emissions are calculated at Kasvener based on Luke's municipal agricultural land and livestock statistics.

PREVIOUS DATA

- Data from the previous year are used.

FINAL DATA

- Agricultural area and number of livestock

F-gases included

Espoo's basic calculation does not include F-gases (hydrofluorocarbons and perfluorocarbons), Sulphur hexafluoride (SF₆) and Nitrogen trifluoride (NF₃). F-gases are manually added to mission calculations from [SYKE's data \(Finnish Environment Institute\)](#) for 2022 baseline.

Other remarks



Espoo does not have a significant amount of manufacturing industrial clusters, historical buildings or an airport. Therefore, emissions of IPPU and Sulphur hexafluoride and Nitrogen trifluoride are not included. As a further development scope 3 emissions should be considered in more detail, and with that development these emissions are more strongly included in the monitoring in the future.

There is no significant agriculture in the Espoo city area, which means that AFOLU emissions are very low. When looking at scope 3 emissions in more detail, these should be taken into account more strongly.

Consumption-based emissions KULMA (not included in the tables)

The carbon footprint of Espoo resident's consumption (scope 3) emissions has been calculated twice, first time in 2020 and again in 2022 using Kulma model. The calculations were developed together and carried out with 19 other Finnish municipalities and an outside expert.

According to results, in 2022, the greenhouse gas emissions from Espoo's consumption totalled 9.07 t CO₂e per capita. In 2020, emissions from consumption were 8.78 t CO₂e. The carbon footprint of consumption consists of energy consumption, construction, mobility, food and the purchase of goods and services. The data sets from 2020 and 2022 are not fully comparable, as emissions caused by the construction of new streets, roads and bridges, and the impacts of free-time residences on consumption emissions were included in 2022 calculations for the first time to gain more comprehensive view.

Kulma model for consumption-based emissions differs slightly from the "Guidance on the baseline emissions inventory for the Climate-neutral and Smart Cities Mission" guidelines. Kulma calculations take into account supply chains and life cycle emissions to greater extent than the Mission guideline requires. The base methodology for the current area-based scope 1 and 2 (and scope 3 for waste) and consumption-based emissions calculations also differ slightly so they are not fully comparable. Consumption-based emissions are partly based on calculated averages, including eg. disposable income, and partly on actual consumption data eg. for food consumption from large operators.

The results of 2022 study are included as an annex:

Annex 1: Kulma_consumption based emissions_Espoo_13062023_ENG

The future emission reduction scenarios

As part of the CCC process, Espoo has done extensive scenario calculations to find out what measures we can take to achieve climate-neutrality. The results of these scenarios and a description of the methodology are described in section A-2.2 *overview: Emission gap and scenarios methodology*. The latest compilation of results (only available in Finnish) is also included as an annex. Annex 2: City of Espoo Future Emission Reduction Scenarios FINNISH (confidential)



3.2 Module A-2 Current Policies and Strategies Assessment

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

A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
Policy	EU	European Green Deal	The European Commission has adopted a set of proposals to make the EU's climate, energy, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.	Espoo's activities align with the Green Deal goal of having at least 30 million electric vehicles on the roads by the end of this decade – a massive increase from the current 1.4 million. Another key contribution is towards future integrated energy system where energy flows between users and producers reducing wasted resources. We are also working to ensure that no one is left behind in green and digital transition.	
Regulation	EU	EU Directive on Energy Efficiency and Energy Efficiency Act	The Energy Efficiency Directive (EU/27/2012) entered into force on 4 December 2012 and its amendment (EU/2018/2002) on 24 December 2018. The Energy Efficiency Directive lays down energy efficiency targets at the EU and national level, the national energy saving obligation and measures and obligations to promote energy efficiency. As part of the Fit for 55 Package, the Commission submitted its proposal on the Energy Efficiency Directive recast on 14 July 2021. The target to reduce energy consumption by 32.5% in the EU will be tightened significantly to 36–39% and the target will become binding. Based on the Commission's formula for	These requirements encourage investments to be directed to improving energy efficiency and, for example, energy-efficient construction.	



			Member States, Finland would need to limit final energy consumption to 255 TWh by 2030.		
Regulation	EU	The Renewable Energy Directive, (RED II; 2018/2001).	Finland has announced that it aims for a renewable energy share of at least 51 percent in 2030. The RED II directive also requires that 14 percent of the energy used by transport in the member states is renewable energy by 2030.	The Directive encourages directing investments to renewables and stabilizes the investment environment.	
Regulation	EU	The Fit for 55 package	The European Climate Law makes reaching the EU's climate goal of reducing EU emissions by at least 55% by 2030 a legal obligation.	The Innovation Fund (IF) and Modernisation Fund (MF) already existing in the EU ETS are retained in the Fit for 55 package and increased, while a new Social Climate Fund (SCF) is introduced.	
Regulation	EU	EU legislation on buildings and construction	The Energy Performance of Buildings Directive EPBD; 2010/31, 2018/44. Construction-related matters such as construction product approvals, the environmental impacts of buildings and the energy efficiency of buildings and construction products. The legislation contains, for example, regulations for urban buildings to utilize solar energy. From 2027, each new government building or private office building larger than 250 square meters must have solar panels.	Legislation guides investments for more environmentally friendly buildings and construction. The renewal of Europe's building stock is expected to reduce energy bills and help curb climate change.	
Plan	EU	RePowerEU	In response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine, the European Commission is implementing its REPowerEU Plan.	Cities have a significant role in accelerating the energy transition described in the RePowerEU plan. REPowerEU Plan entails additional public and private sector investment by 2027.	



			Launched in May 2022, REPowerEU is helping the EU to save energy, produce clean energy and diversify its energy supplies.		
Initiative	EU	New European Bauhaus	The New European Bauhaus is a creative and interdisciplinary initiative that connects the European Green Deal to our living spaces and experiences.	Espoo is part of CrAFt Cities Network that supports New European Bauhaus (NEB) ambition of co-creating inclusive, aesthetic and sustainable cities.	Sharing models and building capacities in making the cities' climate-neutral transformations beautiful, inclusive and sustainable.
Initiatives	EU	New European Innovation Agenda; 100 Intelligent Cities Challenge & Digital Cities Challenge; European Capital of Innovation	Espoo is one of Europe's leading innovation cities, ICC mentor city and three-time iCapital finalist (2019, 2020, 2022). Espoo is committed to using innovation and digitalisation to better the lives of its citizens.	Espoo's climate activities build upon these successes in fostering collaborative innovation ecosystems that support the green and digital transition.	Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions. Developing Espoo 3D city model and digital platforms to support climate action.
Declaration	EU	Circular Cities Declaration (since 2020)	The Circular Cities Declaration is a commitment from European cities and regions to use the levers at our disposal coherently across the organisation to transition from a linear to a circular economy. Espoo signed the commitment in 2020 and follows its ten objectives to promote systemic development of circular solutions.	Circular Cities Declaration provides a systemic framework to promoting circular economy in the city with residents and stakeholders. Circular transition is one of the key way to reach climate goals in sectors that have large environmental impact and resource demand.	Guidelines, tools, support, and yearly reporting to support transition to circular economy.
Policy and regulation	National	Climate-neutral Finland by 2035 National Climate Act	The national emission reduction targets are -60% by 2030, -80% by 2040 and -90 % but aiming at -95 % by 2050, compared to the levels in 1990.	The Act enables the development of a stable investment environment towards net zero cities. As Finland's second largest city, Espoo community plays a key role in delivering the national climate goal.	



			According to the Act, Finland must be carbon neutral by 2035 at the latest.		
Government programme	National	A strong and committed Finland: Programme of Prime Minister Petteri Orpo's Government	Petteri Orpo's government is committed to the objectives of the Climate Act. The Government will focus its climate action on generating cost-effectiveness, technology neutrality and sustainable business while recognising the importance of a long-term approach across parliamentary terms for attracting investments. Finland will be a leader in clean energy: A stable and predictable operating conditions for business will be offered to promote cleantech investments.	The programme is expected to promote sustainable private investments, particularly large-scale energy projects. However, renewable fuel distribution obligation is planned not to rise as fast as expected thus affecting emissions of car traffic.	Need to identify other ways to cut down transport related emissions to reach the goal of climate-neutrality.
Strategy	National	Carbon neutral Finland 2035 – national climate and energy strategy	The National Climate and Energy Strategy outlines measures by which Finland will meet the EU's climate commitments for 2030 and achieve the targets set in the Climate Change Act for reducing greenhouse gas emissions by 60 per cent by 2030 and being carbon neutral by 2035.	The strategy focuses on the green transition and the phasing-out of Russian fossil energy. It is estimated that the share of renewable energy will rise above Finland's indicative minimum target presented in the EU's Fit for 55 Package by 2030. On the other hand, Finland will exceed the indicative final maximum energy consumption laid out in the Fit for 55 Package. The electrification of the energy system and the use of system integration are vital topics.	
Roadmap	National	Roadmap to fossil-free transport (2021)	National roadmap to align with the goal of carbon neutral Finland by 2035. According to roadmap, by 2030, Finland will reduce emissions from domestic transport by at least 50 per cent compared to the 2005 level. The aim is to achieve an entirely fossil-free transport sector by 2045.	Cutting down emissions from transport is Espoo's key challenge in achieving climate-neutrality. National measures, such as renewable fuel distribution obligation and reforming the transport system towards more sustainable transport modes are needed to reach the goal.	
Commitment	National	Sustainable development Commitment 2050	The Society's commitment is a national strategy for sustainable development	Organizations, companies and individuals can make operational commitments for sustainable development. In Espoo city	Personal commitments by citizen on



				organisation, more than 200 commitments have been made by city departments and in schools, sustainability commitment is an integral part of each school's curriculum.	sustainable lifestyle can be encouraged for further impact.
Agreement	National	Municipalities' Energy Efficiency Agreement (2017-2025) Property and Building Sector Energy Efficiency Agreement (2017-2025)	In Finland, energy conservation and energy efficiency has been promoted with agreements between the government and municipalities since 1990s. The voluntary Energy Efficiency Agreements are key instruments for Finland to achieve the targets set by the Energy Efficiency Directive (EED).	<p>Espoo is committed to the Energy Efficiency Agreement for Municipal Sector (KETS) between the years 2017 and 2025. The agreement supports the achievement of Finland's energy and climate strategy goals by promoting energy efficiency and measures related to the use of renewable energy. The key objective of the agreement is to reduce total energy consumption by 7.5% by the end of 2025 in comparison to the 2015 level.</p> <p>In addition, city-owned rental housing company Espoon Asunnot has joined energy efficiency agreement for rental housing companies and also aims to reduce total energy consumption by 7.5 per cent by the end of 2025 compared to 2015.</p>	
Regulation	National	Land Use and Building Act (927/2021), (132/1999)	New construction and large-scale renovations will be subject to a minimum requirement of renewable energy. In construction projects, it must be ensured that at least 38 percent of the calculated purchase energy used in the energy calculation in a new building or a building undergoing large-scale repair is renewable energy, if it is technically, functionally and economically feasible.	These requirements ensure investments in renewable energy in new construction and large-scale renovations.	
Agreement	National	National Green Deals on Emission-free worksites and	National Green Deals are voluntary fixed-term agreements by which solutions are sought to climate challenges, loss of biodiversity,	<u>Emission-free worksites – Green Deal on sustainable procurements 2020-2030</u> The objective of the agreement is to reduce emissions generated in the worksites	Implementing the goals of the green deals through public procurement



		sustainable demolition	overconsumption of natural resources and promotion of a circular economy in Finland. The agreements are concluded between the State and the business sector. Agreements can also be concluded with public bodies such as government agencies and local governments. Green Deals bring together parties that have a key role in achieving the desired change.	through public procurements on a long-term basis. The aim is also to boost the introduction of new low-emission technologies. By 2025, all new worksites of the contracting entities should be fossil-free and 100% of the non-road mobile machinery used in the worksites powered by fossil-free fuels. <u>Green Deal on sustainable demolition, 2020–2025</u> The main objective of the agreement is to increase the reuse and recycling of demolition materials by promoting the functioning of the markets for demolition materials from repair and demolition projects.	
Roadmap	Regional	Helsinki-Uusimaa Regional Climate Roadmap	Helsinki-Uusimaa is aiming at climate neutrality by the year of 2030, in line with the forerunner cities such as Espoo, of the region. The urgent goal of climate neutrality is done in cooperation on a wide scale in all sectors; public, private and RDI and furthering shared projects. The climate actions are based on local strengths and the sharing of best practices.	Five climate spearheads for mitigation in Helsinki-Uusimaa are chosen as the most vital and urgent themes for climate neutrality: 1. Climate smart land use and construction 2. Smart and emission-free mobility 3. Fast and fair energy transition 4. Climate neutral circular economy 5. Together with sustainable consumption and production.	
Agreement	Regional	Helsinki Region Land Use, Housing and Transport Plan (2019)	The agreements concerning land use, housing and transport are concluded by the State with the largest urban regions. The purpose is to facilitate and support the cooperation between municipalities in urban regions and between municipalities and the State in the guidance related to the urban	The main goal of the MAL 2023 planning is a climate-neutral, prosperous and successful Helsinki region. The MAL 2023 plan aims to build a region where current and future residents can live good lives and enjoy smooth everyday travel. The plan will also provide a sustainable solution to the region's growth and ensure good conditions for	



			structure and coordination of land use, housing and transport.	business and other activities. A sustainable transport system and the associated measures are essential to the plan.	
Strategy	Regional	Smart specialisation strategy for Helsinki-Uusimaa Region (2020)	Smart Specialisation is an innovation policy, enabling the region to recognize its strengths and to emphasize them in efforts and investments. Sustainable development goals, ambitious climate targets and a sustainable growth are the basis for research and innovation activities in the region.	Climate neutrality by 2030 is one of three strategic priorities of the strategy. Areas covered by the theme include, circular economy solutions, new sources of energy, bioeconomy innovations and new materials.	
City strategy	Local	Espoo Story 2021-2025	<p>Espoo Story is the city strategy, a narrative created together with city employees, citizens, communities, and companies. This tool for strategic and participatory leadership was introduced in 2012 by the mayor and has since evolved and expanded.</p> <p>Espoo Story is based on a holistic understanding of sustainable development and outlines climate-neutrality by 2030 as one of the seven key targets for the city organisation.</p>	Strategic commitment to climate-neutrality by 2030 approved City Council. Climate-neutrality as one of key targets for the whole city organisation. These targets guide the preparation of annual city budget and operational plans. Espoo Story highlights collaboration and working together with the whole community as a key strength and attribute of the city.	
Development programme	Local	Sustainable Espoo programme 2021-2025	Cross-sectoral development programmes are Espoo's key instrument of breaking financial, administrative, and political silos to implement Espoo Story in tackling systemic issues such as climate change. Sustainable Espoo is the longest running of the four programmes (in operation since 2013). It is owned by the Mayor. The programme's steering group has representation from all the political groups represented in	The programme has its own yearly budget that is used as a seed funding to bring multiple times more resources from EU level, national, and private funding to support the climate and sustainability goals. The Steering Group is responsible for the good alignment of the project portfolio to steer systemic change. It also provides a place to discuss and tackle any potential political and practical controversies of the activities as well as a platform where rapid learnings are	Steering group and action portfolio for delivering Climate City Contract



			the city council, the youth council and city officials from different city sectors.	gathered to inform and affect future policy making.	
Action plan	Local	Sustainable Energy and Climate Action Plan (SECAP) 2019-2030	Espoo joined the Covenant of Mayors in 2010. In 2019, Espoo prepared a Sustainable Energy and Climate Action Plan, SECAP where it identified 60+ actions leading to the climate-neutrality target in 2030.	SECAP identified measures aimed at reducing electricity consumption, district heating and traffic emissions that are particularly significant for the realisation of the emission reduction target. With the identified mitigation measures, Espoo's emissions were estimated to be reduced by approximately 75% from the 1990 level by 2030. As part of the CCC process in 2023, additional measures have been identified and emission reduction scenarios updated.	
Voluntary Local Review	Local	Espoo VLR 2020	The Voluntary Local Review assesses the city's operations, cross-administrative programmes and projects in relation to the 17 sustainable development goals of the UN's Agenda 2030 programme.	Builds capacity in the city organisations and stakeholders to understand the interconnected nature of sustainability and climate targets.	Integrating climate targets and co-creation to VLR 2025 process with different departments and stakeholders.
Commitment and roadmap	Local	Espoo Clean Heat	Espoo Clean Heat, provides a flagship example of efficient decarbonization and a transition to local self-sufficient heating on a large scale. Fortum and the City of Espoo have prepared a roadmap and signed a joint commitment to transformation that will result in carbon-neutral district heating by 2030.	Espoo's district heating system is undergoing a major transformation to replace fossil fuels with smart and flexible solutions that are largely based on renewable electricity. The use of coal will be discontinued in 2025.	
<p>Local plans and policies to be developed to further support the transition to net zero : Climate-neutral Espoo 2030 Roadmap (2023) Climate budget 2024 (2023) Sustainable Urban Mobility Plan (SUMP) and Sustainable Urban Logistics Plan (SULP) (2024) Espoo Master Plan 2060 Nature-Wise Espoo roadmap</p>					



A-2.2 overview: Emission gap and emission reduction scenarios process & methodology

As part of the preparation of Action Plan, the transition team of Espoo together with experts representing different city departments and stakeholders and with the help of external expert developed three scenarios to forecast future GHG emission reductions:

- Pessimistic scenario that assumes no new emission reduction measures are planned or implemented in the city. In this scenario, the city's emissions performance is affected by factors such as the city's growing population.
- Climate-neutral Finland 2035 scenario that assumes Espoo's emissions development will be affected by climate policy measures and policies at national level. The scenario also takes into account the growth of the city and the impact of EU legislation.
- Climate-neutral Espoo 2030 scenario that assumes the city's emissions development is influenced not only by national policies but also by climate actions taken by the city and its partners, such as Fortum and HSY.

Climate-neutral Espoo 2030 scenario was chosen as the baseline scenario for CCC development. It is based on actions identified in 2019 SECAP and further developed with the city organisation, partners and stakeholders during the CCC process. More detailed descriptions of the actions are described in Part 5.2 Module B-2 Climate Neutrality Portfolio Design and in B-2.2: Individual action outlines. While many of these actions have been previously planned for, they require continuous commitment and work by the city and its stakeholders and have therefore been included in the Action Portfolio.

According to Climate-neutral Espoo 2030 scenario, the city would in 2030 reach -72 % emission reductions compared to baseline year 1990 (that Espoo City Council has approved as a baseline for the city's climate neutrality target) and -65 % emission reduction compared to the newest emission data available (2022). While these reductions are substantial, they still fall short of the ambitious target of climate-neutrality. Therefore additional possible future actions were identified during the CCC process to demonstrate the potential pathways for reaching the climate-neutrality goal by 2030 and their impacts on emission reductions were studied in an additional update of the scenarios in August, 2023. Additional actions that have not yet been decided but would have significant emission reduction potential and bring us further in reaching our climate targets were identified and will be considered when developing future policies. However, it is important to note that the implementation of these actions has not yet been agreed upon in the city's political decision-making process and/or by stakeholders is therefore uncertain. All additional actions are included in *Module B-2 Climate Neutrality Portfolio Design* and in *B-2.2: Individual action outlines* under the label *Additional actions*.

Additional actions identified could achieve emission reductions in 2030:

- 80% reduction compared to 1990 emissions
- 78% reduction compared to 2022 emissions

The results of both Climate-neutral Espoo 2030 scenario and additional actions are presented in Table A-2.3.

All scenario calculations are based on the existing climate emissions monitoring methodology (described in A-1.6: Description and assessment of GHG baseline inventory) and public data sources on the emissions impacts of the actions. A summary of the scenarios is presented in *Table A-2.3 Emissions*



reductions in existing strategies by 2030 (based on city's scenario calculations 2021). More extensive background material is available as an Annex, however only in Finnish.

Based on the scenarios, emissions will still be generated in 2030, especially from transport. While Espoo is aiming for fast uptake of e-mobility, in Espoo will still be petrol and diesel cars in traffic in 2030. The share of emissions from lorries will increase as emissions from other road transport decrease. There are also some inaccuracies in the calculation method that can be corrected in the next CCC rounds, for example the use of national emission factor for electricity instead of taking into account for example the use of emission-free electricity by the city and other local stakeholders.

The pathway for dealing with residual emissions and carbon sinks is described in more detail in the section B-2.3: Summary strategy for residual emissions.

As a further note, F-gases are not included in the 2030 scenarios, because they are not included in our original baseline calculation. We are developing the calculation to include them in the future. F-gases are manually added from additional database to baseline, as explained in the section A-1.6: *Description and assessment of GHG baseline inventory and emissions gap calculations*.

Annex 2: City of Espoo Future Emission Reduction Scenarios FINNISH (confidential)



A-2.3: Emissions gap. Our Action Plan addresses all emission reductions from 1990 level. Added baseline 2022 and target (from Scope 1 and 2 emission + waste from scope 3)																		
	1990 Baseline emissions <i>*The climate-neutrality goal approved by the city council has 1990 as baseline</i>	2022 Baseline emissions		Residual emissions offsetting ¹		Baseline emissions reduction target from 2022 ²		2030 Emission forecast based on Climate-neutral Espoo Scenario (1/2023)				Emissions gap			Additional actions identified for further emission reductions (8/2023) <i>NOTE: The execution of additional actions has not yet been decided in city decision-making process</i>			
	(absolute) kt CO2e	(absolute) kt CO2e	(% from 1990)	(absolute) kt CO2e	(%)	(absolute) kt CO2e	(%)	(absolute) kt CO2e from 1990	(%) from 1990	(absolute) kt CO2e from 2022	(%) from 2022	(absolute) kt CO2e in 2030 from 1990	(absolute) kt CO2e in 2030 from 2022	2022 emission gap from target	(%) from additional actions CO2e	(absolute) reduction kt from total emissions in 2030	emission reductions % from 2022	emissions % from 2022
Buildings (energy) total	616	573	93 %	115	20 %	458	80 %	498	81 %	454	79 %	119	4	1 %	32	87	85 %	15 %
District heating	316	332	105 %	66	20 %	265	80 %	304	96 %	319	96 %	13	-54	-20 %				
Oil heating	78	56	72 %	11	20 %	45	80 %	76	98 %	55	98 %	1	-10	-22 %				
Electric heating	65	56	87 %	11	20 %	45	80 %	42	66 %	34	60 %	22	11	25 %				
Electricity consumption	158	129	82 %	26	20 %	103	80 %	75	48 %	46	36 %	83	57	55 %				
Transport (incl. traffic from working machinery)	340	314	92 %	63	20 %	251	80 %	172	51 %	147	47 %	168	105	42 %	56	112	64 %	36 %
Waste	101	22	22 %	4	20 %	17	80 %	93	92 %	14	65 %	8	3	19 %		8	65 %	35 %
Industrial Process and Product Use (IPPU)	There is no significant manufacturing industry in the city of Espoo.																	
F-gases	NA	34	NA	7	20 %	27	80 %	NA	NA		0 %	NA		0 %	NA	NA		
Agricultural, Forestry and Land Use (AFOLU) Skenaarioissa maatalous	3	1	37 %	0	20 %	1	80 %	2	69 %	0	16 %	0,9	1	80 %		1		
Total	1 060	944	89 %	303	20 %	755	80 %	765	72 %	615	65 %	295	117	16 %	88	207	78 %	22 %

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

A-3.1: Systems & stakeholder mapping		
(Fill out according to AP Guidance) – e.g.		
System description	Stakeholders and networks involved	Influence and interest
Energy systems: Espoo Clean Heat	Fortum, waste heat providers (e.g. data centre providers, HSY), consumers	Transition to carbon-free district heating. New business opportunities
Energy systems: housing, industry and services	Consultation companies, HOA's, construction sector, land-owners, citizens, R&D sector	New business opportunities, innovation, reduction of energy costs
Energy systems: energy optimization and savings in city-owned buildings	Caruna, Fortum, Caverion	New business opportunities, innovation, reduction of energy costs, new services towards energy grids
Energy systems: enabling electrification	Caruna, Fortum, e-mobility and charging service providers, R&D sector	New business models, carbon-free district heating and transport, innovation and new technologies
Mobility and transport: walking and cycling	Helsinki Regional Transport HSL, local bike shop business, Mobility services (City Bikes, Scooters, Car Share etc.)	Transition to active transport modes New business opportunities, innovation and co-creation
Mobility and transport: public transport	Helsinki Regional Transport HSL, Mobility Services Companies	Transition to public transport, Fossil free public transport
Mobility and transport: e-mobility and biofuels	ITS Finland, Caruna, Fortum, Virta, Plug It, Parking operators (Aimo Park and Finn Park) ST1, Neste, Gasum, ProAgria Infra services in mobility transition	New business opportunities, innovation and co-creation. Promoting new sustainable fuels.
Built environment: sustainable city districts	Real estate and construction sector, other cities (capital region)	Competitiveness, exchange of best practises
Built environment: low-carbon construction and emission-free worksites	Ministry of the Environment, NGOs (e.g. Green Building Council, Finnish Property Owners Rakli etc.), educational institutions, R&D sector	Directive role & getting input, new services and products
Waste and circular economy: waste treatment	HSY, waste management companies, energy companies	Transition to move waste treatment towards a circular economy that retains value by reusing materials over and over.
Waste and circular economy: circular solutions	start-ups, new service providers for shared ownership, companies and research organisations within	New business opportunities, innovation and co-creation

	different material ecosystems (value chains) such as plastics or concrete.	
Green infrastructure & nature-based solutions: preserving carbon sinks	Public and private landowners, construction and development companies, HSY, SYKE, LUKE	Preservation of carbon sinks, climate change adaptation and preservation of ecosystem services
Green infrastructure & nature-based solutions: biodiversity and nature-based solutions in urban environment	Public and private landowners, construction and development companies, SYKE, LUKE, local nature organizations	New business opportunities, attractiveness and comfort of the living environment

RAKKE – a solution path to sustainable growth ecosystems is a project hosted by the city of Espoo in 2021-23 to strengthen cooperation between the public and private sectors and promote innovation and business activities in fields crucial to the city's climate and sustainability targets. During the project the city has developed ecosystems in low-carbon transport, renewable energy, circular economy and smart and clean urban solutions together with 104 companies and organisations creating foundation for increasingly efficient climate and sustainability actions. The learnings and the concrete next steps identified in the project are integrated in the section 4.2. Climate Action Portfolio.



2030 Climate Neutrality Action Plan



Espoo Sustainable Development Ecosystem partners



As part of the project Solution Path for Sustainable Growth Ecosystems (RAKKE)



Ecosystem partners identified in the RAKKE project.

A-3.2: Description of systemic barriers – textual elements**Energy systems**Barriers:

- National economic support for giving up oil heating or similar unsustainable technology may decrease compared to previous years
- Learnings gained during the energy crisis of 2022-2023 be forgotten when energy prices decrease leading to less incentives for energy-savings
- Investments to energy infrastructure and renewable energy production slow down because of financial insecurities
- Energy system working at its limits because of rapid electrification (EV charging, local renewable production)
- Under current legislation, the site where members of an energy community use electricity must be located in the same real estate or a comparable group of real estate hindering the development of decentralized energy communities that would distribute energy to public electricity network.

Opportunities:

- Electrification is important for reducing emissions in heat production. Electricity can be used to generate heat particularly with heat pumps that utilise waste heat.
- Batteries and heat storages and flexible consumption of electricity and heat will allow for increased non-combustion-based energy production.

Mobility and transportBarriers:

- Modal split change needs behavioural change and that is difficult and slow.
- Winter conditions lower the use of active transport modes (walking, cycling).
- Charging infrastructure is a bottle neck in shift to e-mobility.
- The city of Espoo consists of both high-density urban areas and rural areas, where implementing sustainable mobility and transport is more challenging.
- Green transition needs investments and investors expect profits in the future. But for example, the demand of biofuels might be unsecure.
- Negative attitudes by residents and/or policy makers towards measures that would restrict private car use or increase its costs (e.g. increasing parking charges or lowering speed limits on highways)

Opportunities:

- Improving the conditions for sustainable modes of transport by investing in infrastructure, prioritising sustainable transport modes in traffic management and developing public transport.
- Active transport choices increase physical health and well-being. Urban environment that encourages people to walk, cycle and use public transport is attractive and safe.
- Finland ranks in fifth place in the global e-mobility ranking by the German Association of the Automotive Industry (VDA). In Espoo, the share of electric vehicles is twice the national average. That makes Espoo one of the global and European frontrunners solving the systemic challenges on a way to full-scale low-carbon mobility, including tapping the full potential of e-mobility.

Built environmentBarriers:

- Lack of knowledge and skills on low carbon construction and materials
- Due to long time spans of urban development, the timing of investments can be challenging.
- Traditional process of urban development has lacked the roles and capacities for steering and coordinating a new kind of co-creational urban development.

Opportunities:

- Provide guidance and tools on low carbon construction



- Global resource scarcity and rising costs of building materials are encouraging the construction sector to develop circular economy solutions, such as reuse of building components and, for example, nature-based solutions in infrastructure construction
- Open the development of city districts as innovation hubs for low-carbon and smart solutions; develop new cross-sectoral governance models

Waste and circular economyBarriers:

- New scalable technology solutions need to be created to make circular materials economically feasible compared to virgin materials.
- Investments for research, innovation and pilots are required. It takes time before the old traditional linear business is replaced with the circular model, lack of funding and risk investment and the operational costs slow down the development and implementation.
- For platform solutions, there is a risk of uneven cost and profit sharing. New ways of business collaboration and data sharing need to be created.
- Legislation and policies change slower than innovations are created, which builds a barrier to scale the solutions to the market.
- The lack of knowledge and negative attitude of the citizens and city employees to change for example procurement process and criteria or to assess the full life cycle costs of the purchases may affect the implementation. The change from investment to buy as a service requires changes also in the investment planning, processes and tools.

Opportunities:

- Developing Kera and Kiviruukki districts as circular economy development areas that bring together circular economy actors and allow for development of new products and services.
- Circular economy improves the quality of life. A fair circular economy creates a sense of community and encourages creativity and prioritising experiences over material values.

Green infrastructure & nature-based solutionsBarriers:

- The population of the capital region is estimated to keep growing rapidly in the next decades, with a significant share of the growth pressure on Espoo. Preserving natural and green areas to ensure adequate carbon sinks and stocks while building homes and services for increasing population is a real threat.

Opportunities:

- Steer the necessary new housing as infill construction along public transport routes
- Develop nature-based solutions for biodiversity and climate mitigation and adaptation

Citizen engagement and social innovationBarriers:

- Engaging the most vulnerable groups of citizens to not leave anyone behind in the transition to climate neutrality is a challenging task as those groups are as well often hard to reach or “passive” participants. Citizens might also lack knowledge about the sustainability themes in order to being able to participate in a meaningful way and make informed statements that have a real positive impact.
- Facilitating social innovation by the city is desirable but requires many times a shift in mindset and changing official processes to being able to enable innovations borne in the local community. The city organization has a multi-faceted role towards its citizens as it increasingly wishes to be a partner and enabler but at the same time has the role of regulator to admit permits and supervising the state of the environment and land-area.
- Limited citizen engagement resources and capacities within the city organisation. Participation and social innovation do not always have real impact on decision-making but might instead result in token participation without substantial impact. Data collected from citizens in surveys, queries, workshops or meetings by one city unit is not distributed to other units and therefore has limited impact.

Opportunities:

- Build capacity on citizen engagement. Move from consultation to partnership.



- Use digital platforms to reach a wider audience and gather input from those who might not attend in-person events.
- Bringing climate issues to participatory structures already in place in the city. For example, engaging vulnerable groups by working together with Espoo's elderly, disabled people and youth councils.

GovernanceBarriers:

- City sectors and departments working in silos that lead to lack of cooperation inside the city organization
- Lack of time or resources by city employees to change and develop existing processes better take into account climate and sustainability goals
- Heavy bureaucracy and limiting regulations
- Resistance to change and negative attitudes

Opportunities:

- Develop collaborative governance and working methods between the city and different stakeholders, including companies, organizations, research institutions and universities, and citizens towards shared and common goals.
- Create communication highlighting co-benefits and develop strategies that leave no one behind to enhance acceptability of climate action.

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

Espoo's climate goals cannot be reached by the city alone but require close co-operation with various stakeholders: private sector, academia, research and innovation actors, ecosystems and networks, other levels of government, other cities and citizens, NGOs and communities.

Climate Policy Co-Creation

Espoo Story, Sustainable Espoo Programme and Climate-neutral Espoo 2030 Roadmap are prepared in co-creation with stakeholders, experts, scientists, and different citizen groups to ensure that climate actions are ambitious, feasible, effective and align with community values. Climate City Contract is used as a learning and impact-driven strategic tool complement these strategies guiding the transition towards net zero.

Transparency and information sharing

[Espoo's Climate Watch tool](#), espoo.fi website, city's publications and communications provide clear and accessible information about the current CO2 emissions, potential pathways to climate neutrality, and the impacts of various strategies.

In-person engagement

Workshops, events, webinars, surveys, meetings and citizen panels provide platforms for dialogue and collaboration with different stakeholders, communities and citizens. Addressing concerns related to social and environmental justice enhance acceptability of the planned climate actions and ensures that effects on different communities, including marginalized groups.

Online engagement platforms

Digital platforms, such as My Espoo on the Map and Espoo's new online participation platform to be launched in early 2024, reach a wider audience and gather input from those who might not attend in-person events.

Education and outreach

Sustainability and climate issues are part of curricula at all levels of education in Espoo. HSY Climate Info, Sustainable Espoo, Villa Elfvik Nature House, libraries, cultural services and NGOs provide information and use climate nudging to empower citizens to make climate-friendly choices and behavior in everyday life.



Scenario planning

Collaboratively developed scenarios for achieving climate neutrality consider various strategies and technologies allowing city officials, decision-makers, and stakeholders to explore trade-offs and select the most suitable pathways.

Development Projects

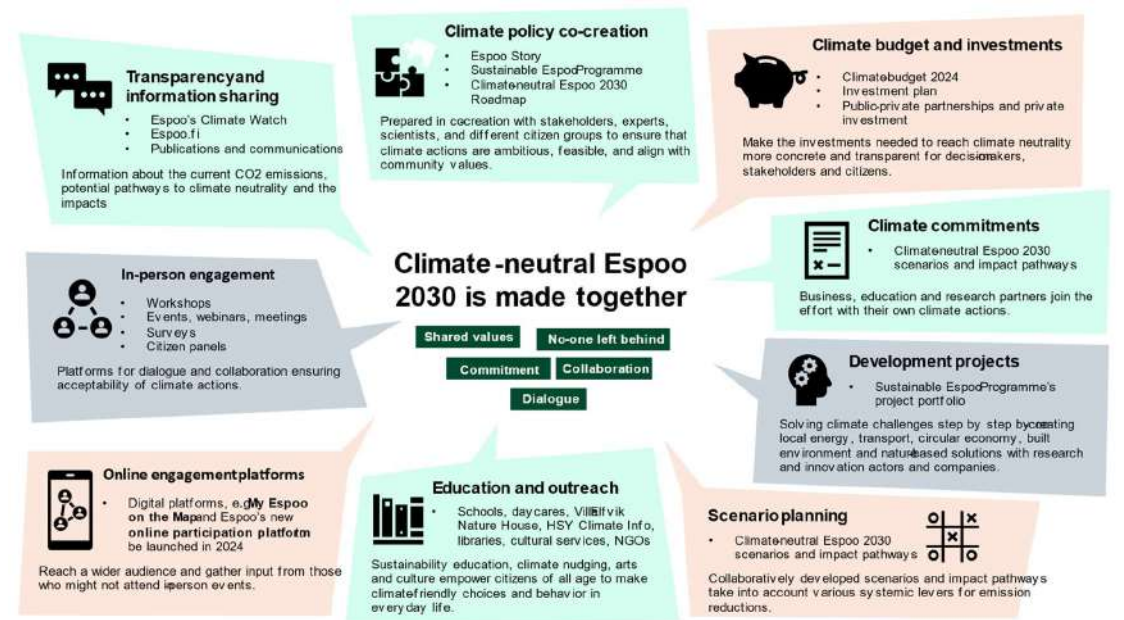
Sustainable Espoo Programme's project portfolio focuses on solving climate challenges step by step by co-creating local energy, transport, circular economy, built environment and nature-based solutions with research and innovation actors and companies.

Climate Commitments

In 2015, Espoo and Fortum committed to joint development of climate-neutral district heating by 2030. This was followed by other commitments with the city's key partners, and in 2023, as part of the CCC process, the city launched new open call for commitments welcoming business, education and research partners to join the effort with their own climate actions.

Climate budget and investments

Espoo's first climate budget makes the goal of climate neutrality more concrete and transparent for citizens, decision-makers and the whole Espoo community in the annual budget 2024 and 10-year investment plan. In addition, different funding sources, public-private partnerships and private investment are explored to contribute towards the ambitious 2030 goal.



Citizen engagement

From consultation to partnership is the slogan that guides Espoo's approach and model to citizen participation. It describes the shift towards a more inclusive and participatory governance. For a long time already, residents have had an opportunity to provide feedback, take initiatives and participate in discussions and workshops, but in ways and processes defined by the administration. The way to move towards partnership-based participation is to give residents a more active role as experts, partners, and decision-makers.

Participation is based on the Espoo story and its targets, including that of climate-neutrality. A sustainable city is not made for the residents, but with the residents. Resident participation is strengthened by moving away from one-off consultations towards ongoing and planned involvement



and interaction in all city operations. Residents' volunteer work and expertise are considered as valuable resources and opportunities.

In Espoo, different ways for residents to participate and influence include:

- Information Participation: Access to information and its production.
- Planning Participation: Involvement in decision-making, both directly and indirectly.
- Action Participation: Engaging in local activities and collaborative efforts.
- Evaluation Participation: Providing feedback and contributing to assessments of services and activities.

Collaboration with residents and local stakeholders presents a unique opportunity for the city. It addresses challenges faced by residents while fostering trust and democracy. Leveraging new technology allows residents to be closer to administration, operations, and decision-making.

In 2022, a new resident participation group was introduced to strengthen the direct links between residents and Sustainable Espoo Programme that coordinates the CCC transition process in Espoo. Partner group that consisted of residents from diverse backgrounds meets regularly in facilitated co-design workshops focusing on different aspects of the city's sustainability and climate issues. The results of each discussion were brought to the steering group of Sustainable Espoo Programme and to Espoo's CCC transition team. The citizen group co-designed ideas of how residents could commit more to climate work in the city. The ideas produced by the citizen group were diverse; a combination of bottom-up and top-down measures as in the form of incentives and enabling as well as giving sanctions and steering citizen to behave and consume in a more climate friendly way, and engaging different groups and entities such as housing companies, NGOs and citizen groups. Climate neutrality goal should be integrated in all the interaction between the city administration and citizen as a shared goal, for example as a condition for participative budgeting projects and support for NGOs. The results are incorporated in the preparation of CCC and the learnings gained in working with such group and methods of co-creation will be incorporated in future projects and actions.

Citizen group also co-created a vision map of what kind of Espoo they would like to see by the year 2050, and it was characterized by circular economy solutions, climate neutral and climate positive transport and energy solutions, nature being present in the city and a strong sense of community.



Take action

The participatory model for Espoo’s climate neutrality work consists of raising people’s understanding of the connection and contribution of their daily conduct to the climate change and ecological crisis and encouraging citizen to action by enabling and making it easier to choose more climate friendly options in their daily life. This will be implemented with providing education and information accompanied with inspiring examples, building enabling infrastructure such as bicycle lanes, accessible routes, e-charging stations and developing public transport and recycling facilities as well as integrating climate neutrality goals to all possible places of interactions with stakeholders such as permissions for organizing events or conditions for funding NGO’s or cooperation with sports clubs – one already existing example being the agreement of sustainable land use in building a new city district in Kera area.

A new citizen panel specializing for sustainability and climate work is being planned with an idea of the citizen group acting also as change agents or change accelerators empowering their own networks. The city is also seeking actively new ways to empower and increase the citizen’s sense of ownership of our environment and shared responsibility of all to take care of it in a sustainable way. Also, personal commitments of citizen on sustainable lifestyle will be increasingly encouraged with campaigns and using the existing national platform of “[Commitment 2050](#)”. In Espoo city organisation, more than 200 commitments have been made by different city departments and in schools, sustainability commitment is an integral part of each school's curriculum.

New clean and climate friendly energy solutions for households must be affordable and accessible (as stated in SDG7). For example, climate friendly mobility must include options for all different user groups as promoting bicycling and walking as sustainable options – although very good and beneficial to health - at the same time can exclude people with moving disabilities. Therefore Espoo’s cross-cutting principles of citizen engagement for climate neutrality are inclusiveness and equality, ensuring that no one is left behind. This will apply especially for vulnerable groups such as low-income families, elderly and disabled people, other minority groups and children and youth. Special attention will therefore have to be paid to incorporate equality factors in the climate work of the city, and this can be done for example by working together with equality, elderly, disabled people and youth councils of the city in addition to other outreach work.



Education is among the sectors that has greatest impact in the promotion of climate neutrality and sustainability in a systemic and long-lasting manner as it contributes strongly to the fact that children grow with a “citizenship skill” of climate friendly lifestyle. The SDG4 also recognises the importance of all learners acquiring the knowledge and skills needed to promote sustainable development. In Espoo the ecological sustainability and climate neutrality is addressed in the curriculum of early childhood education and schools as part of the holistic sustainability framework. Apart from the teaching itself, this translates into participative action in schools and day cares for example in the saving and recycling materials, minimizing food waste, learning urban gardening, and strengthening the connectedness with nature.

Participation is a pre-requisite for sustainable cities and communities as it is also highlighted in the SDG11 for example with the notion of inclusiveness. Espoo is actively developed towards a more co-creative approach with willingness to engage citizens in partnership, doing together and supporting grass roots initiatives. The idea of developing the city not only for the citizen but *with* the citizen is the key to planning new climate action.



5 Part B – Pathways towards Climate Neutrality by 2030

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

5.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

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

Note: Additional possible future actions were identified during the CCC process to demonstrate the potential pathways for reaching the climate-neutrality goal by 2030 and will be considered when developing future policies. However, it is important to note that the implementation of these actions has not yet been agreed upon in the city's political decision-making process and/or by stakeholders is therefore uncertain. ***Additional actions are presented in Impact Pathway and Action Portfolio in italics*** to separate them from other actions.

Fields of action	Systemic levers	Early changes (1-2 years)	Late outcomes (3-7 years)	Direct impacts (Emission reductions by 2030 from 2022)	Indirect impacts (co-benefits)
Energy systems	Governance, policy, regulation, and local development strategies	<p>Sustainable Espoo Programme defines energy as one of five focus areas setting joint targets</p> <p>Strategic collaboration agreements with local energy utility companies Fortum and Caruna</p> <p>District-level guidelines to promote local energy production and energy efficiency (Finnoo and the sustainability criteria; Kera development commitment)</p>	<p>Joint systemic understanding, vision and shared goals by the city and energy utility companies.</p> <p>District-level guidelines, zoning regulations and/or regional energy assessments in use in multiple city districts for new innovative and flexible district level sustainable energy systems.</p> <p>Next phase of energy efficiency contracts and measures by City of Espoo and Espoon Asunnot</p>	<p>Direct impacts of energy systems portfolio of actions: -454 (absolute) kt CO₂e from 2022 to 2030</p> <p><i>Additional actions -32 (absolute) kt CO₂e from 2022 to 2030</i></p> <p>95 % of district heating is carbon-</p>	<p>Improved energy-efficiency</p> <p>Improvement in air quality</p> <p>Local job and value creation</p> <p>Green & digital transition of local economy</p> <p>Business opportunities for SMEs</p>



		<p>Zoning regulations, regional energy assessments and stakeholder cooperation to guide land-use planning towards energy efficiency and sustainable energy solutions</p> <p>The City of Espoo is committed to the energy efficiency agreement for municipalities for the 2017-2025 term</p> <p>Espoon Asunnot is committed to the energy efficiency agreement for rental housing companies for the 2017-2025 term.</p> <p>National regulation on energy communities developed to enable decentralised energy communities to participate in the energy market.</p>	<p>Achieving the new goals of the EU energy efficiency and energy performance of buildings directives</p>	<p>neutral in 2029 (5 % compensation)</p>	<p>Reduction in energy bills of households and industry</p> <p>Reduced energy poverty</p> <p>Improved energy security</p> <p>Diversification of energy supply</p> <p>Reduced dependency on energy imports</p> <p>Reduced economic susceptibility to fluctuations in energy prices</p>
	<p>Technology and infrastructure</p>	<p>District heating production</p> <ul style="list-style-type: none"> • Industrial-scale air-to-water heat pumps and additional electric boilers • Additional electric boilers (testing the use of dynamic connection, first in Finland) • Microsoft data center construction and operations begin • Suomenoja last coal unit closes at the latest in 2025 <p>Electricity grid development provides infrastructure to reduce CO₂-emissions of energy production and</p>	<p>District heating production:</p> <ul style="list-style-type: none"> • Coal burning has been given up completely • Recycling waste heat from Microsoft's data centre region provides 40 % of the consumed district heat <p>Collaboration around Espoo Clean Heat is enhanced</p> <p>District-level energy systems planned in wider collaboration with different stakeholders for new and existing city districts, land-use planning as enabler for sustainable energy systems.</p>		<p>Improved resiliency</p> <p>Improved sense of community</p> <p>Adoption of climate-friendly lifestyle</p> <p>Increased understanding of energy</p> <p>Active citizenship</p>



		<p>energy use in Espoo, supports electric mobility solutions actualization and sustainable built environment development.</p> <p>The City of Espoo and Espoon Asunnot Oy are participating in the demand side management (DSM) of the local district heating grid.</p> <p>Europe's largest geothermal heating and cooling system for a commercial building implemented in Lippulaiva at Espoonlahti.</p> <p>DSM solutions for heating and electricity implemented by the private sector in Espoo (Lippulaiva, Iso Omena, Sello, TA-Yhtymä, Kojamo)</p> <p>Investments into renewable energy solutions within the city's own building stock. Increasing the production of solar electricity.</p> <p>Replacing fossil fuels within city owned buildings by 2025 either by renewable district heating or geoenergy.</p> <p>Energy manager and building monitoring service used in city-owned buildings to increase energy efficiency and find new solutions to increase energy performance.</p> <p>Following new topics of sustainable energy, considering city's role as</p>	<p>Dynamic electricity connections for more applicable electricity consumption sites to reduce peaks and balance needs in grid capacity.</p> <p>Demand side management for heating and electricity implemented in more and more public and private buildings</p> <p>Heating in city's building stock is fossil-free. 10% of the energy consumption of new buildings is covered with locally produced energy (solar, geothermal, wind).</p> <p>Energy manager and building monitoring service used in city-owned buildings continues and expands.</p> <p>Increasing the production of local renewable electricity (solar, wind etc) and energy storage solutions provides local clean electricity. Supporting the formation of local energy communities, helps reduce peaks in consumption and support smooth grid development pace.</p> <p>Energy storage solutions for both electricity and heat are increasingly implemented in the city by different stakeholders.</p> <p>City-owned buildings testbeds for new solutions.</p>		
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		<p>supporter and enabler, current topics include SMRs and hydrogen.</p> <p>Energy storage solutions for both electricity and heat are piloted in the city by different stakeholders.</p>			
	<p>Culture, social innovation, citizen engagement and participation</p>	<p>Sustainable Espoo resident participation group strengthens the resident-based approach and their inclusion in Espoo's sustainable development work.</p> <p>Energy plays an increasingly visible role in residents' daily lives and public interest on the topic is highlighted by energy crises and rising prices.</p> <p>Energy transition creates opportunities for new roles for residents and the forming of energy communities.</p> <p>Providing understandable and accessible advice, support, and information to citizens on:</p> <ul style="list-style-type: none"> • energy saving methods • solar power • pricing and maintenance agreements for different energy systems <p>(Citizens' needs on energy related information identified SPARCS survey 2022)</p> <p>Establishing a solar community in Espoo is made easy by online portal.</p>	<p>Systemic participation of citizens in city planning and services through Espoo participation model. Solid service path for new building permits supporting and providing guidance in sustainable energy.</p> <p>Active energy citizenship is increased. Citizens are aware of their household's energy issues, motivated to save energy and invest in sustainable energy. New model for energy advisory has been implemented, the model is based on resident activity and co-learning and co-creating, with modest support from the city.</p> <p>More energy and solar communities that produce their own energy and feed surplus energy into the electricity grid.</p> <p>More renewable and circular energy sources (e.g. solar and geothermal energy, excess heat) are used by households and companies.</p> <p>Energy communities create a forum for knowledge-sharing and help in forming new habits that promote a more sustainable lifestyle.</p>		



	<p>Sustainable Espoo Programme projects include citizen engagement activities focusing on energy systems (SPARCS, KETO)</p> <p>Schools teaching students about energy citizenship and energy saving energy.</p> <p><i>Encouraging residents to buy certified green electricity.</i></p>	<p><i>Demand for certified green electricity has risen.</i></p>		
Capacity and capability building	<p>Multi-stakeholder development projects leveraging wide-ranging partner cooperation for innovative, local and sustainable energy solutions.</p> <p>Interior eco-support network empowering and building capacity of city officials to promote energy savings at city workplaces.</p> <p>New capacities needed as building owners become electricity producers and charging points for vehicles move from filling stations to homes.</p>	<p>New operating models and services tested and implemented promoting renewable energy production and energy efficiency.</p> <p>City employees implement energy-saving measures in workplaces.</p> <p>Citizens have gained new capacities as local energy producers (prosumers).</p>		
Finance, public procurement and business models	<p>Investments by Fortum to implement Espoo Clean Heat roadmap towards carbon neutral district heating by 2030.</p> <p>The City of Espoo purchases renewable district heating and carbon-free electricity for city-owned buildings.</p> <p>Joint “solution path” to renewable energy identified with key local stakeholders (RAKKE ecosystems)</p>	<p>Implementation of Espoo Clean Heat roadmap continues and is completed by 2030.</p> <p>Implementation of accompanying power grid investments by Caruna to facilitate increased electricity use.</p> <p>Increased investments by households and businesses to solar panels, geothermal energy and other</p>		



		<p>Energy efficiency and sustainable energy solutions included in public procurement criteria for new buildings and refurbishments of city building stock.</p> <p>Households' and businesses' investments in sustainable energy solutions such as solar panels and geothermal energy encouraged by sharing information highlighting both economic and environmental benefits.</p> <p>Business Finland Decarbonized Cities Programme encourages companies to develop solutions to selected challenges in the energy sector.</p>	<p>sustainable energy modes help to save energy and cut energy bills.</p> <p>Decarbonized Cities Programme has funded the creation of new low-carbon solutions with Espoo as testing and reference platform.</p>		
Mobility & transport	Governance, policy, regulation, and local development strategies	<p>Helsinki Region Land use, housing and transport agreements (MAL) 2023 plan guides the regional development of sustainable transport system.</p> <p>Sustainable Espoo Programme 2021-2025 defines transport as one of five focus areas setting joint targets</p> <p>Cycling promotion programme 2013-2024</p> <p>City planning based on public transport corridors</p> <p>Identifying target areas for pedestrianisation in urban centres</p> <p>Parking concessions for EVs</p>	<p>Joint systemic understanding, vision and shared goals by the city and key stakeholders</p> <p>Developing Sustainable Urban Mobility Plan (SUMP) and Sustainable Urban Logistics Plan (SULP) in co-operation with stakeholders and citizens creates a traffic system that better addresses their needs</p> <p>City planning around newly opened public transport services (subway, light rail) improving accessibility of public transport</p> <p>Reducing speed limits on motorways from 120->100 km/h and 100->80 km/h.</p>	<p>Direct impact of mobility and transport portfolio of actions (incl. working machinery): -147 (absolute) kt CO2e from 2022 to 2030</p> <p><i>Additional actions</i> -56 (absolute) kt CO2e from 2022 to 2030 (includes the negative impact of lowering the renewable fuel distribution obligation in national regulation)</p>	<p>Healthier citizens</p> <p>More liveable city</p> <p>Improvement in air quality</p> <p>Less noise</p> <p>Better road safety</p> <p>Local job and value creation</p> <p>Green & digital transition of local economy</p> <p>Business opportunities for SMEs</p>



		<p>Low emission lane on the main highway</p> <p>Strategic collaboration agreement with local electricity distribution company Caruna to prepare the network for increased electrification of mobility</p>	<p>Setting an environmental zone for lorries e.g. on 60 % of streets and collaborating with companies to create sufficient market to meet the need of no CO2 emission lorries.</p>	<p>Increased uptake on walking, cycling, public transport and e-mobility</p>	<p>Reduced dependency on imported fossil fuels.</p>
	<p>Technology and infrastructure</p>	<p>New subway and light rail lines opening 2022/2024 in south/east Espoo</p> <p>Park&ride facilities for cars and bikes along public transport routes</p> <p>Development of walking and cycling network. Cycle corridors target network identified and guides the development.</p> <p>Renovations and improvement of traffic safety on existing cycle lanes.</p> <p>Improvements on cycle parking.</p> <p>EV charging available in Espoon Asumus housing</p> <p><i>The Espoo Master Plan 2060 will define a public transport implementation programme, one part of which may be the Matinkylä-Leppävaara tramway.</i></p> <p><i>Public and private investments in infrastructure of smart charging of electric cars.</i></p>	<p>Better infrastructure for sustainable transport modes and EV's</p> <p>City rail expansion 2028 improving accessibility of public transport in central Espoo</p> <p>Urban centres design and construction promotes a walkable city.</p> <p>Half of 2050 high-quality target network for cycling ready by 2030 (60 km).</p> <p>High-quality cycle parking at rail stations</p> <p>Improved EV charging infrastructure in city-owned buildings, housing companies and other public and private buildings encourages the uptake of e-mobility.</p> <p>Electric vehicles enable energy storage and the optimisation of energy supply and demand</p> <p><i>Matinkylä-Leppävaara express tramway or other rails construction.</i></p>	<p>Reduced emissions of road transport</p>	<p>Reduced economic susceptibility to fluctuations in prices of fossil fuels.</p> <p>Adoption of climate-friendly lifestyle</p> <p>Increased understanding of mobility choices.</p> <p>Active citizenship</p> <p>Increased private investment</p>



	<p>Culture, social innovation, citizen engagement and participation</p>	<p>Sustainable Espoo resident participation group strengthens the resident-based approach and their inclusion in Espoo's sustainable development work.</p> <p>Compiling a map of special accessibility areas to share information with city planners.</p> <p>Collaboration with NGO's and cycling community.</p> <p>Teaching adults bicycling and maintenance skills and boosting bicycle-related business.</p> <p>Schools encouraging students to use sustainable mobility modes.</p> <p>Communication to diverse target groups to encourage sustainable mobility choices in everyday life.</p> <p>Espoo Disability Council has a special working group to work on issues related to accessibility in built environment and public transport.</p> <p>Espoo Elderly Council influences the planning, preparation and monitoring of the city's activities important to older people's well-being, health, inclusion, living environment, housing, mobility or coping with daily activities.</p>	<p>Systemic participation of citizens in city planning and services through Espoo participation model</p> <p>Popularity and accessibility of public transport, walking and cycling grown</p> <p>Horizon-funded MOBILITIES project engages citizens in the SUMP process.</p> <p>More citizens, including children and adults representing marginalized groups, have the practical skills and knowledge to make sustainable mobility choices</p> <p>Built environment and public transport are accessible for all, including the disabled and the elderly.</p>		
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	<p>Capacity and capability building</p>	<p>Building knowledge of the elements of walkability and liveability of urban space for city planners.</p> <p>Interior eco-support network empowering and building capacity of city officials on how to promote sustainable mobility choices at workplaces</p> <p>Capacity building of housing associations on how to install electric car charging infrastructure and the national subsidies available.</p> <p><i>Building the capacities needed set an environmental zone for lorries. Collaborating with other cities and businesses to develop solutions to meet the future need of CO2 emission free lorries.</i></p>	<p>Better knowledge and capacities by city officials to promote sustainable transport, walkability, and liveability in their work.</p> <p>Housing associations are aware of benefits on installing EV charging infrastructure.</p> <p>Horizon-funded MOBILITIES project aiming to develop a more advanced SUMP/SULP including future automated transport and UAVs</p>		
	<p>Finance, public procurement and business models</p>	<p>Guidelines for EV charging points in the city</p> <p>Promotion of e-mobility uptake through procurement practices, permitting processes, urban planning, and land use solutions</p> <p>Promotion of biofuels by strengthening the conditions for the production and distribution of biogas and public procurement.</p> <p>Close co-operation with grid operators and charging infra providers.</p>	<p>Increased number of EV charging points and electric vehicles</p> <p>Implementation of accompanying power grid investments by Caruna to facilitate increased electricity use.</p> <p>Electrification of city buses continues</p> <p>New bicycle-related business models</p> <p>New research, design, innovation, and business models in sector integration of energy and mobility.</p>		



		<p>Low emission city fleet</p> <p>Electrification of city buses (50% by 2025)</p> <p>50 % discount on parking fees for full electric cars</p> <p>Affordable city bike system to complement public transport</p> <p>Supporting local bike shops by communications and offering facilities.</p> <p>Joint “solution path” to fossil-free fuels identified with key local stakeholders (RAKKE ecosystems)</p> <p>OPULI platform, innovation environment and living lab for clean (professional) transport and energy business</p> <p>Business Finland Decarbonized Cities Programme encourages companies to develop solutions to selected challenges in transport and mobility.</p>	<p>Decarbonized Cities Programme has funded the creation of new low-carbon solutions with Espoo as testing and reference platform.</p>		
Built environment	Governance, policy, regulation, and local development strategies	<p>Sustainable Espoo Programme 2021-2025 defines sustainable land use and construction as one of five focus areas setting joint targets.</p> <p>Preparation of new Espoo Master Plan 2060 begins with City Board agreeing its goals emphasizing sustainable city growth, climate smartness, improvement of transport connections,</p>	<p>Joint systemic understanding, vision and shared goals by the city and stakeholders.</p> <p>New Master Plan 2060 guides the development of climate-smart city of networks.</p> <p>Regulation on low carbon construction is established. In Espoo, guidance is</p>	<p>Built environment, project portfolio affects other emission sources, no direct emission reductions on scope 2 emissions.</p>	<p>New and innovative solutions for the construction sector</p> <p>Sustainably built and maintained high-quality streets, parks, homes, workplaces, schools, and kindergartens are at</p>



		<p>liveability and attractive city environments, and proximity to nature.</p> <p>Espoo's principles for land use and housing 2022-2025 adopted to further promote climate-friendly land use policies.</p> <p>New national Building Act to steer low carbon construction systemically from 2025 onwards.</p> <p>Decrees on the climate declaration, declaration of building products and limit values for the carbon footprint of construction to be included in the National Building Code.</p> <p>Testing and developing innovative incentives and commitments to support low-carbon and smart urban development, testing environments and investments especially in the city districts of Kera and Finnoo.</p> <p>Espoo implements the voluntary National green deal agreement towards emission-free construction sites.</p>	<p>provided by the city's building control unit that guides and advises on construction and its impact on the environment, provides planning guidance and decides on building permits.</p> <p>Kera and Finnoo districts developing as forerunners of smart, low-carbon and circular city development. Similar innovative incentives and commitments applied to other Espoo city districts under development.</p>	<p>Scope 3: reduced construction site emissions</p> <p>New sites constructed by the city and by Espoon Asunnot are planned for A energy class.</p>	<p>the heart of a healthy and safe everyday life</p> <p>Improved energy and resource efficiency</p> <p>Reduced need of virgin raw materials</p> <p>Liveable and resilient way of life</p> <p>Spatial quality</p> <p>Local job and value creation</p> <p>Business opportunities for SMEs</p> <p>Adoption of climate-friendly lifestyle</p> <p>Active citizenship</p> <p>Improved community spirit</p> <p>Increased private investments to low-carbon solutions.</p> <p>Improved accessibility of built environment</p>
	<p>Technology and infrastructure</p>	<p>Piloting and demonstrating new low-carbon construction solutions.</p> <p>Emission calculation tools in zoning, regional construction and infrastructure construction.</p>	<p>Buildings have carbon footprint limits and new buildings have smaller carbon footprints.</p> <p>Concentration of construction and infrastructure in local centres and brownfield areas.</p>		



		<p>Espoo 3D city model and digital platforms supporting holistic planning and management.</p> <p>The possibilities of heat recovery of geothermal, solar energy and waste energy as well as wooden construction are evaluated on a site-by-site basis.</p>	<p>10 % of the new buildings' energy consumption is produced with renewable energy produced on site (solar electricity, geothermal heat, wind power).</p> <p>No fossil fuels are used on city's own construction sites after 2025.</p> <p>Promoting lower-emission construction equipment and transport vehicles.</p>		<p>More beautiful, inclusive and sustainable built environment</p> <p>Increased understanding of low-carbon construction and urban environment</p>
<p>Culture, social innovation, citizen engagement and participation</p>		<p>Sustainable Espoo resident participation group strengthens the resident-based approach and their inclusion in Espoo's sustainable development work.</p> <p>Co-creation of city districts with different stakeholders; city as an orchestrator and platform.</p> <p>SPARCS co-creation model toolkit to facilitate co-creation of a sustainable and smart urban area developed and piloted in Kera.</p> <p>5G urban network built by Nokia — the global 5G leader headquartered in Kera — enables the use of advanced circular economy, mobility, and IoT solutions in the district.</p> <p>Espoo 3D city model and digital platforms enable local project managers to integrate diverse stakeholders using shared virtual environments.</p>	<p>Systemic participation of citizens in city planning and services through Espoo participation model</p> <p>SPARCS co-creation model toolkit used in further development of districts.</p> <p>Virtual platforms enable stakeholders to observe and analyse alternative design solutions contributing towards sustainable urban districts.</p> <p>Digital platforms enable dialogue with residents to understand specific needs such as requirements of individuals with reduced mobility when developing city districts.</p> <p>My Espoo on the Map survey becomes an established part of the initial data for urban planning and is updated regularly.</p> <p>Espoo Master Plan planners gather information through studies and surveys by hearing experts in various fields discussing matters with residents and</p>		



		<p>My Espoo on the Map survey for residents and use of the experience-based data in city planning.</p> <p>Residents, NGOs, companies and other Espoo-based parties provided with opportunities to participate in the preparation of the new Espoo Master Plan 2060.</p> <p>Espoo Disability Council has a special working group to work on issues related to accessibility in built environment and public transport.</p> <p>Espoo Elderly Council influences the planning, preparation and monitoring of the city's activities important to older people's well-being, health, inclusion, living environment, housing, mobility or coping with daily activities.</p>	<p>stakeholders, such as business representatives and the operators in charge of the City's technical maintenance to develop a comprehensive, data-based and holistic plan.</p> <p>Built environment and public transport are accessible for all, including the disabled and the elderly.</p>		
	<p>Capacity and capability building</p>	<p>Capacity building on the effects of new national Building Act on local level.</p> <p>Capacities and tools developed to facilitate co-creation of a sustainable and smart urban areas; requiring new systemic thinking by both city officials and stakeholders.</p> <p>Espoo takes part in CrAFt reference cities network learning and sharing ideas on how to develop climate-neutral, beautiful and inclusive cities in line with the New European Bauhaus (NEB) initiative</p>	<p>Systemic participation of citizens in city planning and services through Espoo participation model</p> <p>Guidance on low-carbon building provided to citizens and developers.</p> <p>City officials and stakeholders have learned new systemic and co-creation-based methods.</p> <p>New methods used to make climate-neutral transformation beautiful, inclusive and sustainable.</p>		



		<p>Internal eco-support network empowering and building capacity of city officials.</p>	<p>City officials promoting more sustainable choices in their work.</p>		
	<p>Finance, public procurement and business models</p>	<p>Multi-organizational development projects promote the creation of development and innovation environments, where companies and research institutes create climate-neutral urban solutions and develop sustainable scalable business models.</p> <p>Joint “solution pathways” to sustainable city districts identified with key local stakeholders (RAKKE ecosystems)</p> <p>Business Finland Decarbonized Cities Programme encourages companies to develop solutions to selected challenges in the built environment sector.</p> <p>Climate-wise control of construction - multi-objective optimization - the carbon footprint and total costs during the entire life cycle of the buildings are assessed and affect the planning phase.</p> <p>Circular economy of infrastructure construction promoted with more sustainable procurement criteria for materials.</p>	<p>New climate-neutral solutions implemented and scaled-up to further city district.</p> <p>Joint solution pathways in four RAKKE ecosystems implemented and developed further with 100 local business and research partners.</p> <p>Decarbonized Cities Programme has funded the creation of new low-carbon solutions with Espoo as testing and reference platform.</p> <p>Costs and carbon footprint of construction projects assessed considering entire life cycle of buildings leading to more climate-wise and cost-effective solutions</p>		



Waste & circular economy	Governance, policy, regulation, and local development strategies	<p>Sustainable Espoo Programme defines circular economy as one of five focus areas setting joint targets.</p> <p>Circular Cities Declaration provides a systemic framework to promoting circular economy in the city with residents and stakeholders</p> <p>Waste management regulations improve sorting opportunities:</p> <ul style="list-style-type: none"> • Biowaste sorting expanded to properties with 1–4 households. • Plastic, glass and carton packages as well as small metal items collected from all properties with at least 5 apartments. <p>City waste management improvements increase the percentage of waste sorted in city premises.</p> <p>Data collection of plastics waste in schools increase understanding of the amount of plastic waste generated.</p> <p>Embedding circularity principles in urban planning and asset management</p>	<p>Joint systemic understanding, vision and shared goals by the city and key stakeholders.</p> <p>Circular economy green deal identifies and implements common goals, common rules, common criteria and most impactful actions.</p>	<p>Direct impact of waste and circular economy portfolio of actions: -14 (absolute) kt CO2e from 2022 to 2030</p> <p>Recycling rates for household waste reach 60 %.</p> <p>Reduce the amount of mixed waste down to 100 kg per capita by 2025 and 85 kg per capita by 2030.</p>	<p>Local job and value creation</p> <p>Green & digital transition of local economy</p> <p>Sustainable competitiveness</p> <p>Business opportunities for SMEs</p> <p>Reduction of waste management costs of private households and businesses</p> <p>Resource efficiency</p> <p>Reduced need of virgin raw materials</p> <p>Liveable and resilient way of life</p> <p>Products, services and infrastructure that is durable and adaptable</p> <p>Adoption of climate-friendly lifestyles</p> <p>Increased understanding of circular economy</p>
	Technology and infrastructure	<p>Cooperation with partners in development projects to create new solutions and pilot new innovations.</p> <p>Building the knowledge-base for the collection and processing of significant local material flows.</p>	<p>Improved sorting opportunities at schools and other city facilities and private households.</p> <p>Reduce the amount of plastic in mixed household waste by half compared to 2018.</p>		



		<p>HSY water management produces most of the energy needed in its own facilities and captures effectively nutrients from the wastewater so that they can be recycled.</p> <p>The pilot of bokashi treatment and use as a fertilizer. Our objective is to demonstrate closed loop material streams and to make green space management more circular. Bokashi is a fermentation process that turns organic waste into a soil improver that adds nutrients and improves soil structure.</p>	<p>The collection and processing of significant local material flows has improved reducing the need of virgin raw materials and promoting the shift to circular solutions in local industries.</p>		Active citizenship
Culture, social innovation, citizen engagement and participation		<p>Sustainable Espoo resident participation group strengthens the resident-based approach and their inclusion in Espoo's sustainable development work.</p> <p>New services (e.g. a ventilated biowaste containers) for small properties for biowaste collection to make sorting easy and inexpensive.</p> <p>Collection of end-of-life textiles piloted in four locations in Espoo.</p> <p>HSY will encourage and advise residents to sort household waste.</p> <p>Climate friendly meals and food wastage reduction in city's food services. "Nudging" used to make vegetarian food choices more</p>	<p>Systemic participation of citizens in city planning and services through Espoo participation model</p> <p>Citizens sorting their waste more efficiently (e.g. biowaste, plastic and textiles).</p> <p>Collection of end-of-life textiles expands.</p> <p>Food served at schools, daycare centres and other city facilities increasingly climate-friendly encouraging citizens to also make sustainable food choices in their daily lives.</p> <p>Increased understanding of benefits of waste sorting and sharing and circular economy services.</p> <p>Events organised in Espoo adhere to principles of circularity.</p>		



	<p>appealing by e.g. placing vegetarian option first in line.</p> <p>Collaboration with education sector, for example involving students to follow-up the plastic waste in their own school in real-time in a sensor pilot.</p> <p>Sustainability in cultural and sports events promoted through guidelines and funding criteria for event organizers.</p> <p>Sustainable Espoo Programme projects include citizen engagement activities focusing on circular and sharing economy.</p>			
Capacity and capability building	<p>Promoting sustainable consumption and circular economy thinking with children and young people as part of the early childhood education, schools and youth work in reducing waste, learning recycling and circular economy.</p> <p>Lessons and materials to support environmental education at schools.</p> <p>Interior eco-support network empowering and building capacity of city officials</p>	<p>Children and youth growing up with circularity mindset.</p> <p>Recycling and the use of circular solutions increased in the city's own premises.</p> <p>City officials promoting circular economy and sustainable consumption in their work (eg. reusing office furniture)</p>		
Finance, public procurement and business models	<p>City districts of Kera and Kiviruukki developed with circularity principles, bringing together circular economy actors and serving as piloting platforms.</p>	<p>Learnings from Kera and Kiviruukki used in the development of other city districts.</p> <p>New circular business models.</p>		



		<p>Ekomo platform for circular economy businesses.</p> <p>Joint “solution path” to circular economy identified with key local stakeholders (RAKKE ecosystems)</p> <p>National Voluntary Green deals as a tool to commit to the circular economy in public procurement. eg. to reduce plastic waste.</p> <p>Espoo procurement IT system update to improve assessment of sustainability in procurement</p> <p>Sustainability and climate requirements discussed with the vendors already in the pre-tender phase.</p>	<p>Improved contract management and follow-up of sustainability requirements and metrics of the contracts. Implementing sanctions where relevant.</p> <p>Increase the number of sustainable purchase criterias and shared also with other public organizations to make them a market standard.</p>		
Green infrastructure & nature-based solutions	Governance, policy, regulation, and local development strategies	<p>Nature conservation measures 2021–2030 promoting the support of existing protected areas and supplement the nature conservation network regionally and qualitatively</p> <p>Espoo has identified 23 sites to become nature reserves by 2030, at the rate of three new sites per year</p> <p>Nature-wise Espoo project: roadmap to biodiversity recovery and the achievement of no net loss by 2035, including development of ecological offsetting</p>	<p>Nature-wise Espoo roadmap defines biodiversity preservation methods and actions. Including established pathways for no net loss and greenspace preservation and recovery.</p> <p>A total of about 390 hectares of new nature reserves by 2030 (23 new sites)</p> <p>Green factor tool promoted in all major land use planning projects (in usable cases)</p>	Preserving carbon sinks to offset the residual CO2 emissions in 2030.	<p>Sufficient and accessible recreational green areas and services</p> <p>Sufficient ecosystem services</p> <p>Environments better adapted to and combating adverse effects of climate change (e.g. floods, drought, urban heat island effect)</p>



	<p>Assessment of carbon sink impacts in planning significant new construction areas</p> <p>Integrating and developing the green factor tool in land use planning to increase greenery in construction and infrastructure projects</p> <p>Steering construction to existing centres to conserve carbon sinks in zoning regulation</p> <p>Recreational visions for major districts</p>			<p>More attractive and pleasant urban environments</p> <p>Reduced air and noise pollution</p> <p>Habitats for local wildlife, including many endangered species</p> <p>Ecological connectivity</p> <p>Liveable and resilient way of life</p> <p>Adoption of nature- and climate-friendly lifestyles</p> <p>Benefits to physical and mental health</p> <p>Improved resiliency</p>
Technology and infrastructure	<p>Protection of green areas and infrastructure to prevent deforestation and to save carbon sinks and storages</p> <p>Promoting permeable surfaces in infrastructure construction and using impermeable surfaces in a diverse manner to maximize the use of urban space and reduce the amount of used materials (e.g. centralized parking to free up space for green infrastructure, utilization of roof surfaces as suggested in Espoo's storm water program and green roof vision)</p>	<p>Possible technological solutions for carbon sequestration</p> <p>Introducing more technical green structures such as green roofs, decks and green walls in urban environments</p>		
Culture, social innovation, citizen engagement and participation	<p>Sustainable Espoo resident participation group strengthens the resident-based approach and their inclusion in Espoo's sustainable development work.</p> <p>Promoting citizens to take care of their environment and biodiversity that</p>	<p>Systemic participation of citizens in city planning and services through Espoo participation model</p> <p>Active citizen promotion of biodiversity</p> <p>Inviting the whole Espoo community – the residents, associations, businesses</p>		

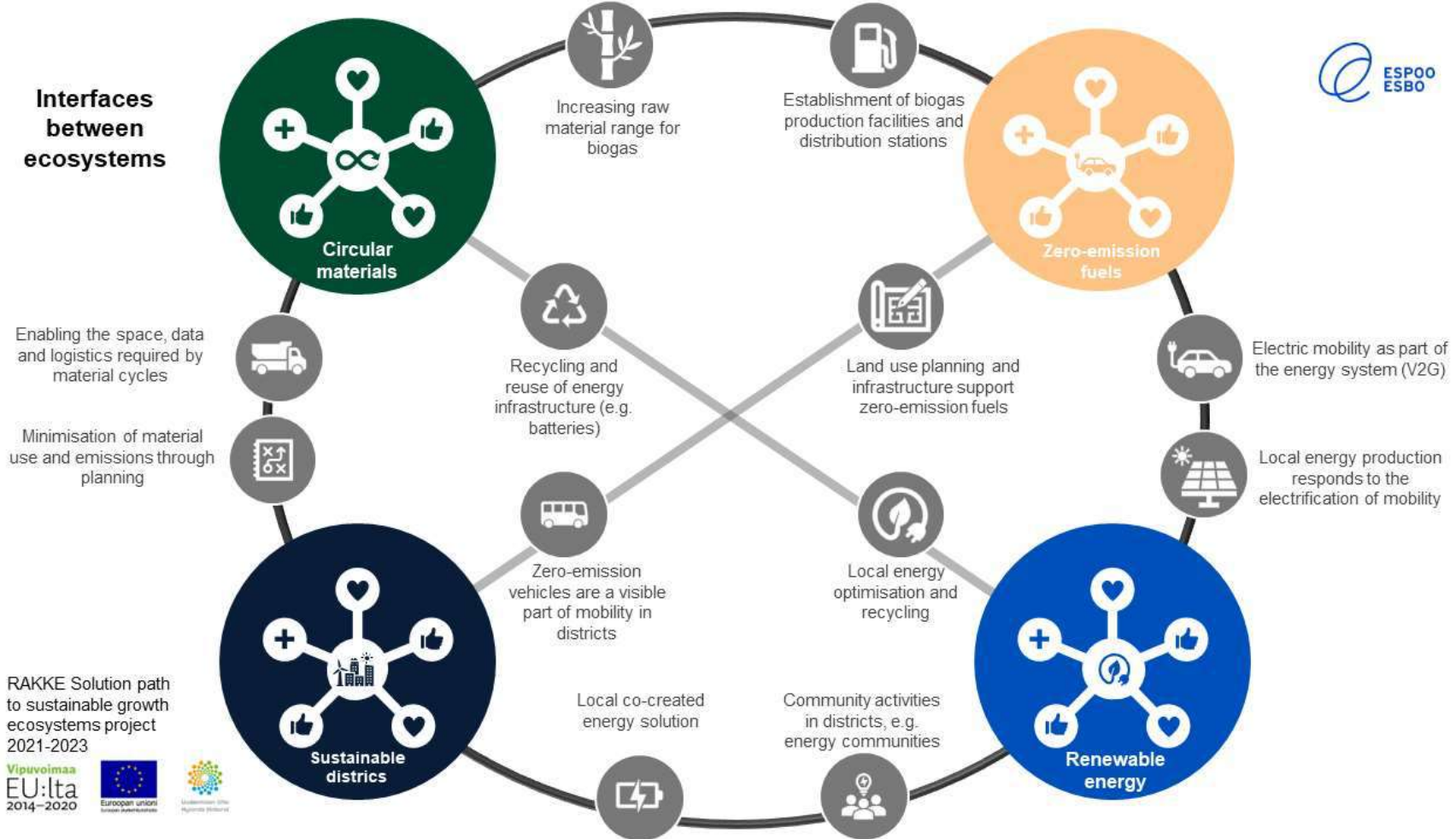


	<p>supports healthier ecosystems and carbon sinks (eg. the “Our Park” initiative, community effort for invasive species eradication, allotments for urban agriculture, gardening food plants in daycares and schools)</p> <p>Supporting local nature associations</p>	<p>and landowners – to participate in preparation and implementation of Nature-wise Espoo Roadmap</p>		
Capacity and capability building	<p>Developing data, knowledge, and future-forecasting methods on carbon sinks</p> <p>Providing children, families, and residents of all age possibilities to learn about nature, its conservation and sustainable lifestyle at city-owned Nature House Villa Elfvik</p> <p>Internal eco-support network empowering and building capacity of city officials</p>	<p>Better understanding and knowledge on carbon sinks enables the city to plan holistically sustainable carbon measures that take into account the values of different green spaces and green structures, as well as the role of vegetation and soils in the carbon balance</p> <p>Increased environmental awareness of residents</p> <p>City officials making more sustainable choices in their work</p>		
Finance, public procurement and business models	<p>Supporting businesses in their nature work integrating science-based targets for nature through a nature-themed business and research network</p>	<p>Private sector’s increased contribution towards the restoration and conservation of biodiversity</p>		



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

**Interfaces
between
ecosystems**



RAKKE Solution path to sustainable growth ecosystems project 2021-2023





5.2 Module B-2 Climate Neutrality Portfolio Design

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

Note: Additional possible future actions were identified during the CCC process to demonstrate the potential pathways for reaching the climate-neutrality goal by 2030 and will be considered when developing future policies. However, it is important to note that the implementation of these actions has not yet been agreed upon in the city's political decision-making process and/or by stakeholders is therefore uncertain. ***Additional actions are presented in Impact Pathway and Action Portfolio in italics*** to separate them from other actions.

B-2.1: Description of action portfolios - textual or visual		
Fields of action	Portfolio description	
	List of actions	Descriptions
Energy systems	<p>E1: Espoo Clean Heat - replacing fossil fuels in district heating</p> <p>E2: Reducing emissions in electricity consumption, oil heating and industrial fuels of housing, industry, and services</p> <p>E3: Energy optimization and energy savings in city-owned buildings</p> <p>E4: Enabling the increased electrification</p>	<p>The goal is an intelligently controlled energy system, which enables households and companies situated in Espoo to use reasonably priced and sustainable energy. In the production, consumption and distribution of energy, new operating models are applied, which will guide towards shaving consumption peaks and saving energy.</p> <p>The energy sector currently produces the largest share of the city's climate emissions and in recent years has also produced the largest emission reductions. Most of these emissions come from district heating, and to address this, the city, together with energy company Fortum, has committed to carbon-neutral district heating by the end of this decade. The use of coal for district heating is due to end in 2025, while other renewable and carbon-neutral energy measures, such as phasing out oil heating and investing in solar panels, will also reduce climate emissions.</p> <p>Developing a smarter and more flexible power grid through cooperation will provide the basis for achieving carbon neutrality in both district heating and transport. The city group's building stock has and will continue to set an example in the adoption of new energy solutions and the promotion of energy efficiency. Energy efficiency and energy saving play an important role in reducing the need for energy production, while bringing economic savings.</p>



<p>Mobility & transport</p>	<p>M1: Promoting walking and cycling</p> <p>M2: Promoting the shift to and reducing emissions of public transport</p> <p>M3: Reducing emission of car traffic</p>	<p>In Espoo, as in other Finnish cities, emissions from transport are a persistent challenge. To achieve the climate neutrality target, total transport emissions in Espoo must start to fall and solutions will be sought for sustainable mobility and transport throughout the city area. This requires both an increase in the share of sustainable transport modes (walking, cycling and public transport) and a shift from fossil fuels to fossil-free fuels. The increase of remote working helps to reduce the need to travel.</p> <p>Espoo is promoting walking and cycling by both improving pedestrian and cycling infrastructure and services as well as promoting them as a desirable mode of transport in everyday life including commuting. The city is co-operating with companies and NGOs in the cycling field to improve residents' cycling and cycle maintenance skills.</p> <p>In recent years, the city has invested heavily in public transportation infrastructure and investments will continue during the 2020s. The extension of the Western Metro (2022), the opening of the Jokeri Light Trail (2024), and Espoo City Rail Link (2028) are significant improvements to the capital region public transport system.</p> <p>Espoo is steering new construction towards district centres and good public transport links. A more unified urban structure that relies on public transport will enable increasing the availability of sustainable modes of transport, because workplaces and services are close by or easily accessible via public transport.</p> <p>In a shift to sustainable modes of transport, the biggest emissions reduction potential in increasing the trips made in public transport, because it's the most attractive alternative to private vehicles in longer journeys that cause greatest emissions. However, walking and cycling complement public transport and play an important role in social sustainability and bring multiple health and other co-benefits.</p> <p>Espoo is Finland's leading city in the uptake of e-mobility and electrification of transport is estimated to have great potential for future emission reductions. The number of electric vehicles is constantly increasing, both in private vehicles, urban logistics and public transport. In the future, electric vehicles will enable energy storage and the optimisation of energy supply and demand. The shift to e-mobility requires close co-operation with the grid operators and charging infra providers as well as improvements in city procurement, permitting processes, urban planning, and land use solutions.</p> <p>The use of biofuels is promoted by strengthening the conditions for the production and distribution of biogas. Espoo will also support the market with its own procurements.</p> <p>The aim of the city is for all is for all residents to be able to make smooth and low-emission everyday journeys supported by well-functioning, low-carbon urban logistics. Developing Sustainable Urban Mobility Plan (SUMP) and Sustainable Urban Logistics Plan (SULP) in co-operation with stakeholders and citizens creates a traffic system that better addresses their needs</p>
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<p>Built environment</p>	<p>B1: Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions</p> <p>B2: Promoting low-carbon construction and emission-free work sites</p>	<p>Espoo uses land-use planning to direct construction to centres and along good public transport connections in a way that is environmentally friendly and sustainable, to preserve carbon sinks and promote the use of public transport. Climate impact assessments are carried out in planning projects to assess the effects on climate emissions, carbon sequestration and adaptation to climate change.</p> <p>Alongside land use planning, Espoo and its partners are testing and developing innovative incentives and commitments to support low-carbon and smart urban development, testing environments and investments in different types of city districts.</p> <p>As Espoo's population grows, so does the need for construction. Espoo controls construction through land use management and builds public infrastructure. Both construction management and city's own construction are important tools that the city can use to promote low-carbon and circular solutions.</p> <p>Resource wisdom and overall sustainability of construction will be achieved by promoting the use of zero-emission energy, energy and space efficiency, flexibility of conversion and the choice of sustainable building materials.</p> <p>Emissions and other environmental impacts throughout the construction life cycle will be reduced, from the manufacture of building materials to the construction phase itself, from the use of the building to the recycling and reuse of materials and parts of the building once it has reached the end of its life cycle.</p> <p>We are implementing the national green deal agreement towards emission-free construction sites. Its aim is to ensure that no fossil fuels are used on city's own construction sites after 2025. In addition, we will gradually move to lower-emission construction equipment and transport vehicles. We also promote emission-free construction sites on private developments through land use steering.</p>
<p>Waste and circular economy</p>	<p>W1: Reducing emissions from waste treatment</p> <p>W2: Promoting circular solutions</p>	<p>Of the household waste generated in the capital region, 47 % is recycled. The rest is incinerated with energy recovery. Household waste do no longer end up in landfills. The goal is to increase the recycling of household waste to 60 % by 2025. This requires more effective and better sorting of the waste where it is generated, so that more waste goes to recycling. By 2030, Helsinki Region Environmental Services HSY, the regional provider of waste management and water supply services, is committed to providing carbon-neutral water services and waste management.</p> <p>In addition, Espoo is working to realise the circular economy by developing its own operations and the cooperation with companies and partners. The city is setting an example through its own actions, providing residents with services and guiding decision-making.</p>



		<p>Espoo promotes circular economy both through the development of its own processes and services, as well as working in cooperation with multiple partners to promote the shift to circular solutions in industry and providing better shared and circular services to residents.</p> <p>In the city's own operations, circular economy is promoted in construction and demolition, efficient use of space, reuse of materials and promoting sustainable procurement practices. In construction, circular solutions include the reuse of wooden elements and metal structures. In the food system, nutrient cycling is important and can be improved, for example, through agricultural land regeneration. In transport, circular solutions include the recycling of batteries for electric cars, biogas from bio-waste and car sharing. Climate friendly meals and food wastage reduction in city's food services promoted in order to reduce consumption-related emissions.</p> <p>City districts of Kera and Kiviruukki act as circular economy development zones, bringing together circular economy actors and serving as piloting platform for future-proof solutions. Espoo strives to be an appealing area for circular economy business as well as collaboration related to research, development and innovation (RDI).</p>
<p>Green infrastructure & nature-based solutions</p>	<p>G1: Directing city growth to built-up areas and preserving carbon sinks</p> <p>G2: Fostering biodiversity and nature-based solutions in urban development</p>	<p>Espoo is an exceptionally green city, where forests cover nearly 60 % of the city's surface area. The goal is to preserve carbon sinks when possible, to offset the residual CO2 emissions in 2030. In addition, Espoo's goal is to be a pioneer in reconciling the needs of a growing city and protection of biodiversity. We are finding ways for the urban development to foster, revitalise and increase biodiversity to achieve not only our climate goals, but also the ambitious goal of no net loss by 2035. Espoo's nature conservation measures include a plan to support existing protected areas and supplement the nature conservation network regionally and qualitatively.</p> <p>Decisions on the city's land use are made by means of zoning. Espoo is investing in infill development and steering construction towards district centres and already built-up areas to conserve carbon sinks and carbon stocks, biodiversity and natural values.</p> <p>However, as the city grows, some new development will inevitably take place on existing green spaces. When planning for new development, especially in forested or marsh area, we assess the impact of the plan on carbon sinks and stocks. We are also actively developing emission calculation tools and methods for land use planning to get a better understanding of the impact of land use on our climate goals. In addition, we promote the deployment of the green factor tool that increases the greenery in zoning projects.</p> <p>While conserving and protecting natural and green areas both within and outside the city's nature reserves is of foremost value, technical green structures such as green roofs, decks and green walls are an important additional way of increasing urban greening in dense urban centres. Espoo promotes the construction of green roofs and steers their</p>



	design and implementation as a part of town planning, plot conveyance and building permit processes. We also analyse the possibilities of restoring habitats and increase the amount of protected natural areas.
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ENERGY SYSTEMS

B-2.2: Individual action outlines		
Action outline	Action name	E1: Espoo Clean Heat - replacing fossil fuels in district heating
	Action type	Technical intervention
	Action description	<p>The production of district heat generates the biggest share of Espoo’s current emissions. The joint Espoo Clean Heat goal of Espoo and the district heating provider Fortum involves transitioning to fully carbon-neutral district heat production during the 2020s. The use of coal for energy production will be discontinued in 2025.</p> <p>The district heating system is undergoing a major transformation to replace fossil fuels with smart and flexible solutions that are largely based on waste heat utilization, renewable electricity, heat pumps and electric boilers, and heat storage solutions such as accumulators. Artificial intelligence optimizes the operations of the entire system.</p> <p>Part of the solution will be a globally unique cooperation project in which Microsoft will build a new data centre in Hepokorpi, Espoo, and Fortum will build a connected large-scale waste heat unit that utilizes the data centres excess heat in the district heat network. This is the world’s largest recovery project for data centre waste heat. The emission-less waste heat produced by the data centres will cover about 40 per cent of the heat demand of the 250,000 district heat users in Espoo, Kauniainen and Kirkkonummi by the end of the decade.</p> <p>All the electricity used by the data centre area and, therefore, all the waste heat created will be emission-free. The recycling of waste heat will replace coal and decrease the use of gas in the production of district heat.</p>



		<h3 style="text-align: center;">Espoo district heating transformation 2014–2029</h3> <p style="text-align: center;">Illustrative</p> <div style="display: flex; justify-content: space-around;"> CO₂ emissions compared to the 2014 level, % Share of carbon neutral production, % </div>
Reference to impact pathway	Field of action Systemic lever	Energy systems Technology and infrastructure Business models Local development strategies
	Outcome (according to module B-1.1)	Carbon-neutral district heating production in Espoo-Kauniainen-Kirkkonummi area <ul style="list-style-type: none"> • Coal burning has been given up completely by 2025 • Recycling waste heat from Microsoft's data centre region provides 40 % of the consumed heat
Implementation	Responsible bodies for implementation	Fortum Timeline: 2023-2030



	Action scale & addressed entities	Espoo and neighboring communities Energy production facilities and houses, flats and buildings connected to district heating system (250,000 end users)
	Involved stakeholders	City of Espoo Microsoft Caruna End-users
Impact & cost	Generated renewable energy (if applicable)	By 2030-> 690 GWh of yearly generation via biofuels, assuming that future investments focus on non-burning methods and production doesn't decrease between 2023-2030. 2050 GWh of total yearly carbon-free generation, assuming 5% compensation and no change in production need.
	Removed/substituted energy, volume or fuel type	By 2030-> 1070 GWh of yearly fossil-based generation to be substituted by carbon-free means, assuming 5% compensation and no change in production need.
	GHG emissions reduction estimate (total) per emission source sector	Emissions 2030 compared to 2022 -319 kt
	Total costs and costs by CO2e unit	Total costs: 229 674 k€ Costs by t CO2e unit: 720 € (In addition, total cross-cutting costs for energy systems : 7 417 k€)

B-2.2: Individual action outlines

Action outline	Action name	E2: Reducing emissions from electricity consumption and oil heating in housing, industry, and services
	Action type	Technical intervention Physical / spatial intervention
	Action description	Energy efficiency will be improved, and the use of renewable energy increased in different types of city districts considering their special characteristics. This includes residential areas, commercial areas, industrial areas and workplace areas that differ from one another by building type, functions and density, among other factors.



		<p>In the climate-neutral Espoo scenario it is expected that oil-heated buildings will switch to other forms of heating as follows: single-family and terraced houses mainly to heat pumps and blocks of flats, service buildings and industrial buildings, about half to heat pumps and half to district heating.</p> <p>The city will promote this systemic change with the development of district-level energy solutions combined with energy guidance and steering. District development will involve extensive cooperation between different sectors. The action considers Espoo's different district types, the collaboration of various energy forms, and the promotion of the usage and sharing of data.</p> <p>In addition, Espoo will promote the development of new functional and economic models and services to increase local renewable electricity production and energy efficiency measures through extensive cooperation. These include trying out and piloting energy communities across property boundaries and surveying investment models that promote energy efficiency and energy communities from the perspective of the city, private operators and residents.</p> <p>Advice and guidance are essential when transitioning towards low-carbon energy and new flexible and economical operating models. The goal is that every person in Espoo has good opportunities to make sustainable choices in their everyday life and influence their surroundings in energy-related matters. The city will contribute towards this systemic change by providing information and encouraging citizens, housing companies and business to choose sustainable solutions to improve energy efficiency and reduce emissions.</p> <p><i>Additional actions identified during the CCC process (potential future actions or actions not yet included in current emission inventories or scenario calculations):</i></p> <ul style="list-style-type: none"> • <u>Large operators utilizing certified green electricity</u>. The City of Espoo does not own an energy company, so the most significant opportunity to influence the electricity market is to purchase certified emission-free electricity. Espoo City Group uses CO2 certified electricity. However, this is not currently reflected in the emissions calculation, but the share of electricity consumed is calculated according to the national average. Additional action scenario takes into account the actual emissions from the Espoo City Group's electricity consumption making visible the impact of city's commitment to purchasing certified green electricity. • <u>Encouraging residents to buy certified green electricity</u>. The scenario estimates that 10% of people in Espoo would buy green electricity in 2030. City's role is to promote this by providing information and communication. • <u>Increasing the production of solar electricity</u>. It is estimated that 0.6 GWh of solar electricity will be added in Espoo by 2030.
Reference to impact pathway	Field of action Systemic lever	Energy systems Regulation Technology and infrastructure Capacity and capability development



		<p>Citizen engagement and participation</p> <p>Business models</p>
	Outcome (according to module B-1.1)	<p>District-level guidelines, zoning regulations and/or regional energy assessments to promote local energy production and energy efficiency.</p> <p>Active energy citizenship is increased. Citizens are aware of their household's energy issues, motivated to save energy and invest in sustainable energy.</p> <p>More energy and solar communities that produce their own energy and feed surplus energy into the electricity grid.</p> <p>More renewable and circular energy sources (e.g. solar and geothermal energy, excess heat) are used by households and companies.</p> <p>Increased investments by households and businesses to solar panels, geothermal energy and other sustainable energy modes help to save energy and cut energy bills.</p>
Implementation	Responsible bodies for implementation	<p>Citizens and housing associations</p> <p>Industry and service companies</p> <p>Timeline: 2023-2030</p>
	Action scale & addressed entities	<p>City-wide</p> <p>Citizens, housing associations, companies</p>
	Involved stakeholders	<p>City of Espoo</p> <p>Energy companies</p> <p>Private businesses, citizens, housing associations</p>
Impact & cost	Generated renewable energy (if applicable)	51 GWh per year of generated energy from heat pumps.
	Removed/substituted energy, volume or fuel type	<p>Substituted oil heating from 2022 -> 160 GWh of yearly consumption substituted to heat pumps and carbon-free district heating. Assuming 95% reduction in buildings utilizing oil heating.</p> <p>Substituted fossil-based electrical energy is dependent on national changes. The percentage of carbon-free electrical production should be 100% by 2035.</p>



<p>GHG emissions reduction estimate (total) per emission source sector</p>		<p>Oil heating Emissions 2030 compared to 2022 -55 kt</p> <p>Reducing emissions from electricity consumption Emissions 2030 compared to 2022 -46 kt</p> <p>Electric heating Emissions 2030 compared to 2022 -34 kt</p> <p><i>Additional actions emissions 2030 compared to 2022.</i> -32 kt</p>
<p>Total costs and costs by CO2e unit</p>		<p>Total costs : 19 359 k€ inside borders city of Espoo. Costs by t CO2e unit : 143 €</p> <p>Most of the renewable electricity generation capacity investments are generated outside Espoo's borders, so the real costs are higher per CO2e unit.</p> <p>(In addition, total cross-cutting costs for energy systems : 7 417 k€)</p>

B-2.2: Individual action outlines		
<p>Action outline</p>	<p>Action name</p>	<p>E3: Energy optimization and energy savings in city-owned buildings</p>
	<p>Action type</p>	<p>Technical intervention</p>
	<p>Action description</p>	<p>Energy efficiency, flexibility, and opportunities to use renewable energy are promoted in Espoo's new construction, renovation and infill development projects. The building stock of the city serves as an example of implementing new energy solutions, such as demand side management, renewable energy and energy efficiency solutions.</p> <p>We aim to cover 10% of the energy consumption of new buildings with locally produced renewable energy generated on site (solar, geothermal, wind).</p> <p>Espoo has reduced the use of energy at its premises in line with the Energy Efficiency Agreement for the Municipal Sector (KETS). By signing the agreement, Espoo made a commitment to reduce the total energy consumption in its premises by 7.5% between 2015 and 2025. This equals 19,611 MWh.</p>



		<p>In addition, city-owned rental housing company Espoon Asunnot has joined energy efficiency agreement for rental housing companies and also aims to reduce total energy consumption by 7.5 per cent by the end of 2025 compared to 2015.</p> <p>Energy savings are also achieved by modernising city premises and street lighting and by replacing old light sources with led technology. This has reduced the energy consumption of lighting on city premises by around 4 %.</p> <p>Espoo and Espoon Asunnot will continue to use zero-emission electricity in all our city buildings. The origin of electricity is guaranteed by guarantees of origin. Gasum purchases emission-free and carbon-neutral certified electricity for the City of Espoo's electricity portfolio on the electricity market. Both the city and the rental housing company also uses Fortum's EkoPlus supplement, which guarantees that district heat is produced from 100% renewable or equivalent energy sources.</p> <p>In addition, Fortum is implementing a heating optimisation service (Smart Living) in approximately 116 properties, which aims to ensure continuously stable conditions in the buildings and optimise the control and energy efficiency of the heating systems and equipment in the buildings. In addition, the aim is to facilitate building maintenance and technical service, for example through remote management, proactive alarms and automated data analysis, and to enable users to monitor and report on the electricity, heat and space conditions in the building. To launch the service, more than 4,000 temperature and humidity sensors were installed in mainly around 110 day-care centres and schools in 2020. The information from the sensors and the weather forecast will be used to control the heating of the property. The service will help to improve indoor temperature uniformity, improve the energy efficiency of the buildings and reduce heating costs and emissions.</p> <p>Espoon Asunnot builds the capacity and knowhow of active residents through annual trainings. The energy expert trainings focus on the basics of energy and water consumption in properties and how to save energy. The aim is to highlight aspects through which residents themselves can influence the reduction of energy consumption.</p>
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology and infrastructure Local development strategies Public procurement
	Outcome (according to module B-1.1)	<p>Heating in city's building stock is fossil-free. 10% of the energy consumption of new buildings is covered with locally produced renewable energy generated on site (solar, geothermal, wind).</p> <p>Energy manager and building monitoring service use in city-owned buildings continues and expands.</p> <p>Achieving the new goals of the EU energy efficiency and energy performance of buildings directives.</p>



		City employees implement energy-saving measures in workplaces.
	Responsible bodies/person for implementation	City of Espoo Espoon Asunnot rental housing company Timeline: 2023-2030
	Action scale & addressed entities	City-wide City-owned buildings
	Involved stakeholders	Fortum Gasum End-users
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	<p>Optimization of heating of city buildings Emissions 2030 compared to 2022 -0,4 kt</p> <p>Heating oil blending obligation Emissions 2030 compared to 2022 -0,3 kt</p> <p>Improvement in energy consumption in the new building stock Emissions 2030 compared to 2022 -0,3 kt</p> <p>Improvement in energy consumption in the old building stock Emissions 2030 compared to 2022 -3,3 kt.</p> <p>NOTE: Emission reductions listed above are also included in E1 and E2 city-wide emission reduction calculations.</p>
	Total costs and costs by CO2e unit	Total costs : 12 513 k€ (In addition, total cross-cutting costs for energy systems : 7 417 k€)

B-2.2: Individual action outlines



Action outline	Action name	E4: Enabling the increased electrification
	Action type	Technical intervention Physical / spatial intervention
	Action description	<p>Espoo aims to phase out fossil fuels for district heating by 2029. The resulting increased electrification of Espoo's district heat production, combined with an increase in electric mobility and other electricity consumption, will also require the development of Espoo's electricity distribution network. This will ensure that the network will remain reliable for Espoo's residents in the future as the energy transition progresses.</p> <p>To this aim, City of Espoo has signed a strategic cooperation agreement with the electricity distribution company Caruna. The aim of the cooperation is to support Espoo's growth and carbon neutrality goals with a strong electricity network that meets the energy needs of the future and enables clean energy solutions for Espoo's residents and businesses. The co-operation includes promoting energy storages, electric transport, and the use of renewable energy.</p>
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Governance and policy Technology and infrastructure Local development strategies
	Outcome (according to module B-1.1)	Implementation of required power grid investments to facilitate increased electricity use enabling carbon-neutral district heating and large-scale shift to e-mobility.
Implementation	Responsible bodies/person for implementation	Caruna City of Espoo Timeline: 2023-2030
	Action scale & addressed entities	City-wide Electric grid Buildings, streets Charging infrastructure
	Involved stakeholders	Fortum E-mobility charging operators
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	No direct emission reductions. Contributes towards / enables actions E1 and M3.
	Total costs and costs by CO2e unit	Total Costs : 109 000 k€



(In addition, total cross-cutting costs for energy systems : 7 417 k€)

MOBILITY & TRANSPORT

B-2.2: Individual action outlines		
Action outline	Action name	M1: Promoting walking and cycling
	Action type	Physical / spatial intervention Other intervention
	Action description	<p>Espoo is developing a more walkable urban environment. We bring together the knowledge of the elements of walkability and livability of urban space for planners. We will identify the characteristics of urban space that influence walkability, so that they can be used in the design and construction of a walkable city. We will identify target areas for pedestrianisation in urban centres, where we will focus on pedestrianisation. We will compile a map of special accessibility areas, i.e. areas where accessibility is particularly important, to share information with planners.</p> <p>We are constantly developing our walking and cycling route network. When building a new street network, our aim is to include the necessary walking and cycling routes and grade separations. Missing routes are being constructed along existing streets. The existing routes are constantly being renovated and their traffic safety is enhanced.</p> <p>We will improve the flow and safety of cycling by converting cycle paths into one-way cycle lanes and improving cycle parking. We will equip all new cycle parking facilities with secure frame-locking racks.</p> <p>We have identified 2050 target network for cycling, with an intermediate goal of half of the target network to be ready by 2030. It describes the key cycling routes in Espoo and includes the high-quality routes, called 'bicycle corridors' and regional routes defined at regional level. The network is complemented by the main routes serving Espoo's internal cycling traffic.</p> <p>The construction is a long-term effort. Most of the target network is existing combined pedestrian and cycling routes. For many parts, the routes in the target network already exist, but their quality level does not meet the targets set. The target network also presents entirely new connections or connection needs to be studied during further planning. Some of the target network will be constructed in connection with other street, road and traffic projects, and part will be carried out as independent cycling projects. Half of the target network (60 km) is estimated to be ready by 2030.</p>



		<p>The city bikes in Espoo and Helsinki are in use from early April to late October. The city bike network shared by the two cities includes almost 4,600 bikes and 460 bike stations. In Espoo, there are 110 stations. The all-season pass (seven months) costs 35 euros making it a very affordable option for most citizens. Also daily and weekly passes are available.</p> <p>To further promote walking and cycling, we communicate to residents, partners and the Espoo community about sustainable transport and the impact of personal mobility choices on climate emissions. We offer cycling courses for adults who did not learn to ride a bicycle as a child. Our communication aims to provide information on the opportunities to make sustainable mobility choices in everyday life. We are testing ways to support companies that provide bicycle maintenance and repair services.</p>
Reference to impact pathway	Field of action	Transport and mobility
	Systemic lever	<ul style="list-style-type: none"> Technology and infrastructure Citizen engagement and participation Capacity and capability development Local development strategies Business models
	Outcome (according to module B-1.1)	<p>Urban centres design and construction promotes a walkable city.</p> <p>Renovations and improvement of traffic safety on existing cycle lanes. Half of 2050 high-quality target network for cycling ready by 2030 (60 km). High-quality cycle parking at rail stations. Popularity and accessibility of walking and cycling has grown.</p> <p>More citizens, including children and adults representing marginalized groups, have the practical skills and knowledge to make sustainable mobility choices.</p> <p>Better knowledge and capacities by city officials to promote sustainable transport, walkability, and liveability in their work.</p> <p>New bicycle-related business models.</p>
Implementation	Responsible bodies/person for implementation	<p>City of Espoo Departments:</p> <ul style="list-style-type: none"> Public works department Traffic planning department Centre of Excellence for Sustainable Development <p>Timeline: 2023-2030</p>



	Action scale & addressed entities	Regional / city-wide Streets Parking facilities
	Involved stakeholders	Citizens Other municipalities in the Helsinki Metropolitan Area Uusimaa ELY Centre Helsinki Regional Transport Authority (HSL)
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	No direct emission reductions. Contributes towards / enables emission reductions in car traffic (M3) and shift to public transport (M2).
	Total costs and costs by CO ₂ e unit	Total costs 25 550 k€ (In addition, total cross-cutting costs for mobility & transport : 6 864 k€)

B-2.2: Individual action outlines		
Action outline	Action name	M2: Promoting the shift to and reducing emissions of public transport
	Action type	Physical / spatial intervention Technical intervention
	Action description	<p>Espoo is steering new construction towards district centres to create a more unified urban structure that relies on public transport. In recent years, the city has invested heavily in public transportation infrastructure and investments will continue during the 2020s. The extension of the Western Metro (2022), the opening of the Jokeri Light Trail (2024), and Espoo City Rail Link (2028) are significant improvements to the capital region public transport system.</p> <p>Western Metro (2022)</p> <p>An extension to subway system has been one of the biggest investments in public transport in the Helsinki capital area during the 2010s and 2020s. West Metro construction project (21 km) was completed and commuter traffic began on phase II, the Matinkylä–Kivenlahti section, in December 2022. Phase I consisted of constructing the Ruoholahti–Matinkylä section, on which commuter traffic began in November 2017.</p> <p>Länsimetro Oy is a limited liability company that is jointly owned by the cities of Espoo and Helsinki. Länsimetro Oy’s task is to build, own, maintain and develop the West Metro system, tracks and stations. After the construction project ended, the focus of Länsimetro’s operations shifted from construction to metro infrastructure ownership. As the owner of the metro infrastructure,</p>



	<p>Länsimetro Oy contributes to ensuring that the metro remains an attractive transport option and serves customers for decades to come.</p> <p>Jokeri Light Rail (2024)</p> <p>Jokeri Light Rail line is being built between Itäkeskus in Helsinki and Keilaniemi in Espoo. The light rail will replace trunk bus line 550, which is the busiest bus line in the Helsinki region. Jokeri Light Rail will increase the reliability, capacity and passenger comfort of transverse public transport. The operations will begin in 2024.</p> <p>Jokeri Light Rail will be implemented with the alliance model. This means that the client organization formed by the cities of Helsinki and Espoo will be combined into one organization, together with the planners and the implementers.</p> <p>New housing and workplaces are planned to be built along the Jokeri Light Rail line in Perkkää, Otaniemi and Keilaniemi, among other areas. Thanks to the proximity of services and the fast light rail, residents will have less need to use their own car.</p> <p>City Rail Link (2028)</p> <p>The City Rail Link and the Turku rail yard project will be the first phases of the new high-speed rail link between Helsinki and Turku. The City Rail Link will further improve public transport connections in the capital region, especially in the developing Espoon keskus and the rapidly growing Leppävaara, also supporting the transformation of the Kera area. The objective is to have the final, legally valid plans at the beginning of 2025.</p> <p>The railway line's construction planning, construction, and commissioning will take place in 2025–2031. Once completed, the high-speed rail link between Helsinki and Turku will create a common commuting area for 1.5 million people. The City Rail Link will considerably promote the sustainable development of Espoo's five urban centres and be an important step towards emission-free transport.</p>
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Currently, one-fifth of Espoo residents' journeys are made by public transport. Helsinki Region Transport (HSL) is responsible for the organisation of public transport, such as planning, operation, timetables, the journey planner and the ticket system.

The number and share of electric buses is growing quickly in the public transport. Electric buses are essential in reaching the goal of cutting emissions from public transport in the Helsinki region by more than 90 percent from 2010 levels by 2025. The electric buses used on HSL's services must be powered by electricity that is sustainably generated in the Nordic countries, for example, by means of wind, water or solar power.



		<p>In 2023, there will be 316 electric buses in the Helsinki Region. In 2025, about half of the buses HSL orders will be electric, which means about 650 buses.</p> <p>The City of Espoo is responsible for the construction and maintenance of public transport infrastructure, such as terminals and stops. The city will design park&ride facilities for cars and bikes along public transport routes. The customer experience of intermodal parking will be improved by investing in guidance and information on intermodal parking.</p> <p>The city will provide sufficient and high-quality cycle parking at rail stations. We will identify the demand for bicycle parking at the busiest bus stops and, where possible, install frame-locking bike racks at bus stops.</p> <p>New transport services will support the use of public transport, walking and cycling and enable sustainable choices in everyday life. This requires continuous development work with businesses, HSL and other cities.</p> <p>Espoo Disability Council has a special working group to work on issues related to accessibility in built environment and public transport. Espoo Elderly Council influences the planning, preparation and monitoring of the city's activities important to older people's well-being, health, inclusion, living environment, housing, mobility or coping with daily activities.</p> <p><i>Additional potential future actions not yet decided:</i></p> <ul style="list-style-type: none"> • <i>Construction of Matinkylä-Leppävaara express tramway: The Espoo Master Plan 2060 will define a public transport implementation programme, one part of which may be the construction of Matinkylä-Leppävaara tramway. The magnitude of the carbon dioxide equivalent emissions of the Matinkylä-Leppävaara tramway can be estimated from the project appraisal of the Jokeri Light Rail tramway currently under construction. Jokeri Light Rail will increase the number of public transport trips by about 4 900 per day in 2030. The modal shift from diesel buses to trams is projected to reduce carbon dioxide emissions from transport by 4 kt per year in 2030. The length of the Jokeri Light Rail is estimated to be about twice as long as the Matinkylä-Leppävaara tramway, which means that the maximum magnitude of the carbon dioxide equivalent emissions reduction of the Matinkylä-Leppävaara tramway could be about 2 kt per year, or about 2 kt CO₂ eq.</i>
Reference to impact pathway	Field of action Systemic lever	Mobility & transport Technology and infrastructure Regulation Public procurement
	Outcome (according to module B-1.1)	City planning around newly opened public transport services (subway, light rail) improving accessibility of public transport. New subway and light rail lines opening 2022/2024 in south/east Espoo. City rail expansion 2031 improving accessibility of public transport in central Espoo.



		<p>Park&ride facilities for cars and bikes along public transport routes. Popularity and accessibility of public transport has grown.</p> <p>Low emission city fleet. Electrification of city buses (50% by 2025)</p> <p>Built environment and public transport are accessible for all, including the disabled and the elderly.</p>
Implementation	Responsible bodies/person for implementation	<p>Helsinki Region Transport (HSL) Länsimetro Oy City of Espoo</p> <p>Timeline: 2023-2030</p>
	Action scale & addressed entities	<p>Regional</p> <p>Public transport infrastructure and operations</p>
	Involved stakeholders	<p>Helsinki, Vantaa, other cities and municipalities in the metropolitan area Investors Citizens / customers</p>
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	<p>Emissions 2030 compared to 2022 -5,12kt/year</p> <p><i>Additional potential future actions not yet decided: Matinkylä-Leppävaara express tramway</i> Emissions 2030 compared to 2022 -2 kt</p> <p>In addition, promoting the shift to public transport contributes towards emission reductions of car traffic (M3).</p>
	Total costs and costs by CO2e unit	<p>Total costs 2 062 936 k€</p> <p>Costs by t CO2e unit 402 917 €</p> <p>The purpose of developing public transport is to create a good and smooth everyday life, so while the cost of emissions per CO2e is high the investments bring multiple co-benefits.</p> <p>(In addition, total cross-cutting costs for mobility & transport : 6 864 k€)</p>



B-2.2: Individual action outlines		
Action outline	Action name	M3: Reducing emission of car traffic
	Action type	Technical intervention Other intervention
	Action description	<p>The emissions of car traffic (private cars and logistics) are reduced by investing in the distribution infrastructure of alternative energy sources and streamlining transport and parking arrangements. We enable renewable fuel distribution stations in land-use planning. We develop park-and-ride facilities and services for public transport and develop and expand parking facilities for shared cars in public areas.</p> <p>Espoo is Finland's leading city in the uptake of e-mobility and electrification of transport is estimated to have great potential for future emission reductions. The number of electric vehicles is constantly increasing. In the future, electric vehicles will enable energy storage and the optimisation of energy supply and demand. The shift to e-mobility requires close co-operation with the grid operators and charging infra providers as well as improvements in city procurement, permitting processes, urban planning, and land use solutions.</p> <p>Espoon Asunnot housing company offers its residents the opportunity to charge their electric or hybrid cars at Espoon Asunnot properties. At a resident's initiative, a remotely controlled smart unit capable of slow charging will be installed on the existing heating pole.</p> <p>The city of Espoo, based on dialogue involving experts from different city departments, will implement common policies and targets on how to develop the charging infrastructure for electric vehicles. The work will include the guidelines for the city's own properties, for parking companies owned by the city in public areas and for parking spaces in Espoon Asunnot housing company. The document will provide guidance for future public procurement, help to measure the uptake of e-mobility in the city and support the implementation of the Clean Vehicles Directive.</p> <p>The City of Espoo will raise awareness among residents about e-mobility. The city will create information material and increase communication to Espoo residents to make it as easy as possible for housing associations and their decision-makers to install electric car charging infrastructure and raise awareness on the national subsidies available for charging infrastructure.</p> <p>The use of biofuels is promoted by strengthening the conditions for the production and distribution of biogas. Espoo will also support the market with its own procurements.</p> <p>In addition to local actions, the emissions of car transport will be influenced by EU and national regulations. Increasing the fuel distribution obligation is estimated to reduce emissions from road transport by 0.7 %.</p>



		<p>To provide a breeding ground for new research, design, and innovation in sector integration of energy and mobility, the city of Espoo in cooperation with Aalto University, VTT and other actors is introducing a new testing platform in the Otaniemi science community. OPULI is a platform, innovation environment and Living Lab for clean (professional) transport and energy business. It combines business intelligence with research activities. Collaboration will take place between different companies, research institutes and the public sector.</p> <p><i>Additional potential future actions not yet decided and/or not included in previous scenario calculations:</i></p> <ul style="list-style-type: none"> • <u>Reducing speed limits on motorways from 120->100 km/h and 100->80 km/h</u> <i>Reducing the speed limit to 100 km/h on motorways in the Espoo area that currently have a speed limit of 120 km/h (about 9 km) and to 80 km/h on roads with a speed limit of 100 km/h (about 25 km).</i> • <u>Faster uptake of electric cars</u> • <i>The number of electric cars in Espoo is expected to grow faster than earlier forecasted. The socio-economic level of Espoo's population is one of the highest in Finland. This is one of the reasons why the growth in the number of electric cars in Espoo has been fastest out all big cities in Finland in recent years. In addition, Espoo and its partners have invested in electric vehicle charging infrastructure and will continue in the future to enable an optimistic growth scenario for electric vehicles. National policies such as subsidies for the purchase of electric vehicles and positive tax treatment have contributed to the growth in the number of electric vehicles.</i> • <u>Setting an environmental zone for lorries on 60 % of streets</u> <i>Ban the use of fossil fuel trucks on parts of Espoo's streets. Diesel trucks would switch to renewable diesel, reducing CO2 eq emissions by 100% (tailpipe emissions). Gas trucks would switch to biogas, reducing CO2 eq emissions by 100% (tailpipe emissions).</i> <p><i>New scenario calculations also take into account the negative effect on emission reductions of lowering the renewable fuel distribution obligation in national regulation. In the new calculation it is assumed that the share of renewable fuels in 2028-30 will remain the same as now planned for 2027, i.e. 22.5 %, compared to 34 % as was previously forecasted.</i></p>
Reference to impact pathway	Field of action	Transport and mobility
	Systemic lever	Technology and infrastructure Regulation Governance and policy Capacity and capability development Business models Public procurement
	Outcome (according to module B-1.1)	Reduced need for citizens to use private car in daily trips due to improvements of accessibility of public transport (M2), walking and cycling (M1).



		<p>Improved EV charging infrastructure in city-owned buildings, housing companies and other public and private buildings encourages the uptake of e-mobility. Increased number of EV charging points and electric vehicles. Parking concessions for EVs</p> <p>Joint solution path to fossil-free fuels implemented with key local stakeholders.</p> <p>New research, design, innovation, and business models in sector integration of energy and mobility.</p>
Implementation	Responsible bodies for implementation	<p>City of Espoo Ministry of Transport and Communications Espoon Asunnot VTT Aalto University</p> <p>Timeline: 2023-2030</p>
	Action scale & addressed entities	<p>National / regional / local</p> <p>Charging infrastructure Biofuel distribution Parking facilities</p>
	Involved stakeholders	<p>Charging operators Biofuel providers Car-owners</p>
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	<p>Emissions 2030 compared to 2022 -142 kt</p> <p><i>Additional actions:</i></p> <p><i>Reducing speed limits on motorways from 120->100 km/h and 100->80 km/h</i> -6,7 kt CO₂-ekv</p> <p><i>Faster growth of number of electric cars</i> -65,6 kt CO₂-ekv</p> <p><i>Setting an environmental zone for lorries on 60% of streets</i> -12,8 kt CO₂-ekv</p>



		<i>The impact of lowering the renewable fuel distribution obligation in 2030 +31.2 kt CO₂ eq.</i>
	Total costs and costs by CO ₂ e unit	Total costs : 56 063 k€ Costs by t CO ₂ e unit : 395 € (In addition, total cross-cutting costs for mobility & transport : 6 864 k€)

BUILT ENVIRONMENT

B-2.2: Individual action outlines		
Action outline	Action name	B1: Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions
	Action type	Technical intervention Other intervention
	Action description	<p>Espoo's districts will be used as pilot environments for companies and research institutes to develop sustainable smart, and scalable urban solutions. Districts will be used as development and pilot environments for companies and research institutes developing sustainable solutions.</p> <p>The city acts as an orchestrator bringing together actors from small start-ups to global companies, universities, and research institutions to find the most impactful solutions. The role of the city is to enable the development and ensure that the work is targeted at the most important development challenges of each diverse district from densely built-up urban areas to smaller village-like centres and areas that are undergoing urban transformation.</p> <p>The focus area for green transition in Espoo and example of an area under major urban transformation is Kera, a former industrial and logistic district that will be developed into a new city center and forerunner in sustainable city development, circular economy, and digitalization through multi-stakeholder co-operation. The City of Espoo and private investors are constructing services and homes for 14,000 future inhabitants. District development is aimed towards resource-wise construction, innovative and low-emission energy solutions, and new digital services and applications such as a Nokia-led unique network of smart street poles, which provide a platform for new data-driven services. The city acts as a facilitator as well as an ecosystem orchestrator and brings the area's residents, landowners, companies, and other development partners around the same table to develop the area together. A commitment for close cooperation, reaching carbon neutrality by 2030, and the use of significant circular economy solutions has been made between the stakeholders. First pilots in Kera started already in 2019, and construction will begin by 2024.</p>



		<p>In the rapidly growing City of Espoo, multiple regional development projects are taking place simultaneously. The learnings from Kera will be used to benefit the development of other parts of the city as well, such as Leppävaara, Espoo Centre, Finnoo, Kivenlahti, Keilaniemi, and Viiskorpi. Without sophisticated digital design tools, such as BIM (building information modelling) solutions, and harmonised information management practices, it would be nearly impossible to carry out complex and evolving urban development projects like those in the Kera district.</p> <p>Espoo 3D city model and digital platforms enable local project managers to integrate diverse stakeholders using shared virtual environments. These virtual platforms enable stakeholders to observe and analyse alternative design solutions for supporting the requirements of functional and sustainable urban districts. Furthermore, the digital platforms allow project managers to engage in dialogue with residents to understand specific needs. These may include the requirements of individuals with reduced mobility or insights into designing and locating services within developing city districts.</p>
Reference to impact pathway	Field of action	Built Environment
	Systemic lever	<p>Local development strategies</p> <p>Business models</p> <p>Technology and infrastructure</p> <p>Governance and policy</p> <p>Social innovation</p> <p>Citizen engagement and participation</p>
	Outcome (according to module B-1.1)	<p>Kera and Finnoo districts developing as forerunners of smart, low-carbon and circular city development. Similar innovative incentives and commitments applied to other Espoo city districts under development.</p> <p>Virtual platforms enable stakeholders to observe and analyse alternative design solutions contributing towards sustainable urban districts.</p> <p>Digital platforms enable dialogue with residents to understand specific needs such as requirements of individuals with reduced mobility when developing city districts.</p>
Implementation	Responsible bodies for implementation	<p>City of Espoo</p> <p>Timeline: 2023-2030</p>
	Action scale & addressed entities	<p>District and/or local scale</p> <p>Buildings and city infrastructure</p>
	Involved stakeholders	<p>Aalto University</p> <p>VTT Technical Research Centre of Finland</p> <p>Nokia</p> <p>SOK</p> <p>HEVI Innovations Programme</p>



		Start-ups, companies, research institutions, citizens
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	No direct emission reductions. Contributes towards / enables scope2 emission reductions in energy and transport as well as scope3 emissions of construction and services.
	Total costs and costs by CO2e unit	Total costs : 2 450 k€ (In addition, total cross-cutting costs for built environment : 3336 k€)

B-2.2: Individual action outlines		
Action outline	Action name	B2: Promoting low-carbon construction and emission-free work sites
	Action type	Technical intervention Physical / spatial intervention
	Action description	<p>Espoo uses land-use planning to direct construction to centres and along good public transport connections. The city also finding ways to reduce the adverse climate effects of its own construction of buildings and infrastructure, by refurbishing existing building stock, and through construction management.</p> <p>Goals of new construction and renovation:</p> <ul style="list-style-type: none"> • New construction and renovation guidance take into account sustainable development and CO2 emissions. • New sites constructed by the city and by Espoo Asunnot are planned for A energy class. • The refurbishment of existing building stock aim for 30 % improvement in energy efficiency. • The possibilities of heat recovery of geothermal, solar energy and waste energy as well as wooden construction are evaluated on a site-by-site basis. • The goal is for 10 % of the new buildings' energy consumption to be produced with renewable energy produced on site (solar electricity, geothermal heat, wind power). <p>With the help of climate-wise control of construction - multi-objective optimization - the carbon footprint and total costs during the entire life cycle of the buildings are assessed and affect the planning phase. The operating model opens up new opportunities for optimizing energy use in support of the city's climate goals. Optimization also contributes to the construction of safe and healthy buildings. The chosen solutions are data-based and can be justified transparently and clearly. Optimization also covers material choices.</p> <p>Concrete steps towards low-carbon construction of city infra include:</p>



		<ul style="list-style-type: none"> • Developing emission calculations as part of the assessment of the effectiveness and costs of infrastructure construction • Promoting circular economy of infrastructure construction with more sustainable procurement criteria for materials • Implementing the national green deal agreement towards emission-free construction sites. Its aim is to ensure that no fossil fuels are used on city's own construction sites after 2025. In addition, we will gradually move to lower-emission construction equipment and transport vehicles. • Paying attention and compensating the effects that large impermeable surfaces such as roofs, streets and parking facilities have in the natural circulation of water and their retention or absorption capacity. • Evaluating the effects on carbon sinks in the planning of significant new construction areas • Developing circulation of construction and demolition materials <p>The city is also preparing for the new national construction law that will enter into force in 2025 and bring numerous new obligations to promote low carbon and circular solutions. These include, for example, the calculation of the carbon footprint and the emission limit values for buildings, the preparation of a material passport and statement, mandatory demolition mapping in all demolition sites, as well as digitization of building information and an information model-based building permit.</p>
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology and infrastructure Regulation Public procurement
	Outcome (according to module B-1.1)	<p>Concentration of construction and infrastructure in local centres and brownfield areas. 10 % of the new buildings' energy consumption is produced with renewable energy produced on site (solar electricity, geothermal heat, wind power).</p> <p>Buildings have carbon footprint limits and new buildings have smaller carbon footprints. Costs and carbon footprint of construction projects assessed considering entire life cycle of buildings leading to more climate-wise and cost-effective solutions. No fossil fuels are used on city's own construction sites after 2025. Promoting lower-emission construction equipment and transport vehicles.</p>
Implementation	Responsible bodies for implementation	<p>City of Espoo Espoon Asunnot</p> <p>Timeline: 2023-2030</p>



	Action scale & addressed entities	Local Buildings and city infrastructure
	Involved stakeholders	Real estate and construction companies Construction industry networks and organisations Other municipalities of the capital region Ministry of the Environment
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	Emissions from construction are not included in scope 2 emission calculations. Espoo has not yet developed emission reduction scenarios for scope 3 emissions so estimated reductions are not available. Traffic emissions are included in Mobility and Transport actions.
	Total costs and costs by CO2e unit	Total Costs : 379 992 k€ (In addition, total cross-cutting costs for built environment : 3 336 k€)

WASTE & CIRCULAR ECONOMY

B-2.2: Individual action outlines		
Action outline	Action name	W1: Reducing emissions from waste treatment
	Action type	Technical intervention
	Action description	<p>Helsinki Region Environmental Services HSY is responsible of the waste management and water supply services including the treatment of wastewater in Espoo. Reducing the climate impact of waste treatment operations is a part of HSY's environmental targets for several years. As a result, the total ghg-emissions from HSY's operating activities has already been reduced nearly 50 % since 2016 and nearly 77 % since 2014. HSY's latest carbon neutrality programme aims to carbon neutrality by 2030.</p> <p>Action plan includes activities related to:</p> <ul style="list-style-type: none"> • reduce the ghg-emissions related to waste treatment processes and energy use • carry out projects that improve energy efficiency • study carbon sequestration possibilities in our operations • support and conduct R&D-activities and projects related to our climate goals • reduce the ghg-emissions from construction • promote and support regional co-operation and project activities in climate change mitigation and adaptation activities together with our partners and stakeholders



		<p>The emission level indicator includes company-owned and controlled ghg-emissions (Scope 1 and 2) and emissions from main outsourced activities (selected scope 3 emission sources.) Scope 1 and 2 sources include the emissions from landfills (CH4), wastewater treatment (CH4, N2O) and composting plants (CH4, N2O) as well as the emissions from fossil fuels and energy use (CO2). Emissions from outsourced activities are mainly related to energy use in various material handling and transport tasks. Approx. 85 % of these total emissions are related to waste and wastewater treatment -tasks, only 15 % are energy related ghg-emissions.</p> <p>Landfill operation activities such as surface structure and gas collection design as well as the energy recovery from landfill gas is one of the key elements to reduce the climate impact in waste handling. In addition, developing the biological treatment of biowaste (digestion & composting operation) in future will increase the energy recovery from biowaste and reduce the ghg-emissions from the treatment. Research on nitrous oxide in waste water treatment (N2O)-occurrence, reduction methods and process optimization possibilities is also one main focus areas in carbon neutrality programme. The energy use of HSY's facilities and company owned vehicles relies strongly on renewable energy sources (biogas, biofuels, green electricity). HSY has been using EKOenergy labelled, 100 % renewable electricity since 2015.</p>
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Technology and infrastructure Local development strategies
	Outcome (according to module B-1.1)	<p>HSY's strategic goals</p> <ul style="list-style-type: none"> • Carbon-neutral water services and waste management by 2030 • Climate resilient Helsinki Metropolitan Area <p>Targeted emission levels 2025: -56% compared to the 2016 level, 89,000 t CO2/year 2030: carbon neutrality (-67 % compared to 2016 level, 64,000 t CO2/year)</p> <p>Indicator: HSY's total emissions, t CO2eq/year (Company-owned and controlled ghg-emissions and emissions from main outsourced activities)</p>
Implementation	Responsible bodies/person for implementation	Helsinki Region Environmental Services (HSY) Timeline: 2023-2030
	Action scale & addressed entities	Regional Citizens, companies and industries



	Involved stakeholders	Espoo and other municipalities Companies
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	Emissions 2030 compared to 2022 -14 kt
	Total costs and costs by CO2e unit	Total costs : 3 708 k€ Costs by t CO2e unit : 265 € (In addition, total cross-cutting costs for waste and circular economy : 3 688 k€)

B-2.2: Individual action outlines		
Action outline	Action name	W2: Promoting circular solutions
	Action type	Technical intervention Other intervention
	Action description	<p>Espoo promotes circular economy both through the development of its own processes and services, as well as working in cooperation with multiple partners to promote the shift to circular solutions in industry and providing better shared and circular services to residents.</p> <p>The main goal of circular economy is to use natural resources in a sustainable way, generating as little waste as is possible. In addition to daily products and services, the entire city, including its services and districts, operates in a sustainable manner. Products and materials remain in circulation for as long as possible, when goods and their components are reused and materials are recycled into raw materials for new products. For example sharing, repairing, reusing and reuse of materials are means of the circular economy to prolong the service life of products and materials.</p> <p>At the end of 2020, we signed the European circular economy commitment Circular Cities Declaration and follow its ten objectives to promote circular solutions:</p> <ol style="list-style-type: none"> 1. Establishing clear circular economy goals and strategies 2. Raising awareness of circular practices 3. Engaging local stakeholders 4. Embedding circularity principles in urban planning and asset management 5. Leveraging public procurement 6. Applying economic incentives to encourage circular behaviour 7. Fostering an enabling local regulatory framework



		<p>8. Collaborating with national governments and European institutions 9. Monitoring the progress made 10. Reporting on progress</p> <p>In the city's own operations, circular economy is promoted in construction and demolition, efficient use of space, reuse of materials and promoting sustainable procurement practices. In construction, circular solutions include the reuse of wooden elements and metal structures. In the food system, nutrient cycling is important and can be improved, for example, through agricultural land regeneration. In transport, circular solutions include the recycling of batteries for electric cars, biogas from bio-waste and car sharing.</p> <p>Espoo strives to be an appealing area for circular economy business as well as collaboration related to research, development and innovation (RDI). City districts of Kera and Kiviruukki act as circular economy development zones, bringing together circular economy actors and serving as piloting platform for future-proof solutions.</p> <p>The city aims to strengthen and promote the collection and processing of significant local material flows in accordance with the principles of circular economy, and thus the cycle of materials can be steered towards the most valuable use in terms of achieving carbon neutrality.</p> <p><u>Helsinki Region Environmental Services HSY</u></p> <p>HSY's goal is to promote the circular economy of the Helsinki Metropolitan Area. In practice this means, that:</p> <ul style="list-style-type: none"> • HSY will act as a coordinator, developer and influencer through information in regional circular economy cooperation. • HSY will promote the nutrient cycling and sludge recovery, and add circular economy aspects to our procurement and construction projects. <p>HSY's goal is to increase the household recycling rate up to 60% by 2025 and reduce the amount of mixed waste in the Helsinki Metropolitan Area and Kirkkonummi. Increasing the sorting of biowaste is of central importance to achieving the goal. In practice this means, that:</p> <ul style="list-style-type: none"> • HSY will enhance the collection and treatment of biowaste, and develop new recycling services to residents. • HSY will encourage and advise residents to sort household waste.
	Field of action	Waste & circular economy



Reference to impact pathway	Systemic lever	Business models Public procurement Governance and policy Capacity and capability development Social innovation Citizen engagement and participation
	Outcome (according to module B-1.1)	Recycling and the use of circular solutions increased in the city's own premises. Improved sorting opportunities at private households. Citizens sorting their waste more efficiently (e.g. biowaste, plastic and textiles). Reduce the amount of plastic in mixed household waste by half compared to 2018. City districts of Kera and Kiviruukki developed with circularity principles. Learnings used in the development of other city districts. Increased number of sustainable purchase criterias in city procurement. Affecting the market standard. New circular business models.
Implementation	Responsible bodies for implementation	City of Espoo Helsinki Region Environmental Services HSY Timeline: 2023-2030
	Action scale & addressed entities	Local / regional / national Citizens, companies and industries
	Involved stakeholders	Research and educational institutions Companies particularly in the construction, plastic, textile, food and waste sectors Circular and sharing economy startups Land owners and operators of development areas Helsinki Uusimaa Regional Council Ministry of the Environment
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	Small direct emission reductions on scope 1 and 2 emission. Contributes towards emission reductions in other sectors such as energy and transport. Greater effect on scope3 emission reductions. Espoo has not yet developed emission reduction scenarios for scope 3 emissions, so it is not yet possible to provide an estimated number of emission reductions.
	Total costs and costs by CO2e unit	Included in total cross-cutting costs for waste and circular economy : 3 688 k€



GREEN INFRASTRUCTURE & NATURE BASED SOLUTIONS

B-2.2: Individual action outlines		
Action outline	Action name	G1: Directing city growth to built-up areas and preserving carbon sinks
	Action type	Nature-based solution
	Action description	<p>Espoo is a green city, where forests cover nearly 60 % of the city's surface area. The city's goal is to preserve carbon sinks when possible, to offset the residual CO2 emissions in 2030. According to latest study on the subject, Espoo's carbon sinks were in 2021 large enough to offset CO2 emissions in 2030, if the emissions can be brought down according to target of 80 % reduction from 1990. Preserving this level of carbon sinks in a rapidly growing city is however a challenge that requires holistic solutions. The knowledge base on the amount and development of carbon sinks is constantly being refined and Espoo is actively involved in the development work. Carbon sinks are being addressed as part of Espoo's master plan, which aims for 2060. Carbon sinks will be considered in land use planning as part of the overall climate impact of land use.</p> <p>Developing the data on carbon sinks is key enabler required for the city to plan holistically sustainable carbon measures that take into account the values of different green spaces and green structures, as well as the role of vegetation and soils in the carbon balance. For forest areas, the natural dynamics of forests and the decline in growth of ageing forests and the natural increase in carbon sequestration need to be recognised. At the same time, however, ageing forests serve their natural and recreational values. By steering measures in a direction that has a positive impact on the carbon balance, effectiveness in the built environment can be achieved quickly. To preserve forested areas that are important as carbon sinks, for biodiversity, and also as recreational areas, Espoo is investing in infill development and steering construction towards district centres and already built-up areas.</p> <p>However, as the city grows, some new development will inevitably take place on existing green spaces. When planning for new development, especially in forested or marsh area, we assess the impact of the plan on carbon sinks and stocks. We are also actively developing emission calculation tools and methods for land use planning to get a better understanding of the impact of land use on our climate goals. In addition, we promote the deployment of the green factor tool that increases the greenery in zoning projects.</p>
Reference to impact pathway	Field of action	Green infrastructure and nature-based solutions
	Systemic lever	Governance and policy Regulation Technology and infrastructure Citizen engagement and participation Capacity and capability development



	Outcome (according to module B-1.1)	<p>Nature conservation measures 2021–2030 promoting the support of existing protected areas and supplement the nature conservation network regionally and qualitatively.</p> <p>A total of about 390 hectares of new nature reserves by 2030 (23 new sites)</p> <p>Better understanding and knowledge on carbon sinks enables the city to plan holistically sustainable carbon measures that take into account the values of different green spaces and green structures, as well as the role of vegetation and soils in the carbon balance.</p> <p>Green factor tool promoted in all major land use planning projects</p>
Implementation	Responsible bodies for implementation	<p>City of Espoo</p> <p>Timeline: 2023-2030</p>
	Action scale & addressed entities	<p>Local / regional</p> <p>Natural and built areas</p>
	Involved stakeholders	<p>Universities and research institutions</p> <p>Residents, associations and landowners</p> <p>Businesses</p> <p>Ministry of the Environment</p>
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	<p>No direct emission reductions on scope 1 and 2 emissions.</p> <p>However, directing city growth to built-up areas helps to preserve carbon sinks to offset the residual CO2 emissions in 2030. In addition, it contributes towards emission reductions in other emission sectors, particularly transport enabling efficient public transportation for citizens.</p>
	Total costs and costs by CO2e unit	Total costs : 9 380 €

B-2.2: Individual action outlines

(fill out one sheet per intervention/project)

Action outline	Action name	G2: Fostering biodiversity and nature-based solutions in urban development
	Action type	Nature-based solution



<p>Action description</p>	<p>Espoo's goal is to be a pioneer in reconciling the needs of a growing city and protection of biodiversity. In 2021 Espoo Strory, the city set a new ambitious goal of no net loss by 2035. It is a state where human activity does not decrease biodiversity or the benefits of nature to humans. To meet the challenge, the city is currently launching Nature-wise Espoo project that will help to find every way possible to secure and increase biodiversity in a growing city.</p> <p>Achieving a state of no net loss is based on a mitigation hierarchy where the goal is to always primarily avoid and minimise the loss of natural values. Negative environmental impacts can be avoided by, for example, directing construction away from valuable natural sites. If this is not possible, attempts to minimise the negative impact are made by e.g. planting trees and vegetation in the area which can be used to secure wildlife corridors. Wildlife corridors include all areas covered by vegetation which form a network between nature's core areas and allow various species to travel from one area to another. If the negative environmental impact cannot be avoided or minimised, the last resort is to offset it by improving natural environments elsewhere.</p> <p>In the Nature-wise Espoo project the city will for example:</p> <ol style="list-style-type: none"> 11. assess Espoo's current city planning and biodiversity preservation practices 12. develop new tools that help take natural values into account during city planning and nature conservation 13. determine which natural sites in Espoo would benefit from restorative measures and if so, what kind of measures <p>Participating in research projects and learning more about other cities' biodiversity restoration practices is important. The knowledge and results obtained during the project will be compiled into a Nature-wise Espoo roadmap which defines biodiversity preservation methods and actions. Inviting the whole Espoo community – the residents, associations, businesses and landowners – to participate will also be one of keys to success.</p> <p>Espoo has identified 23 sites to become nature reserves by 2030, at the rate of three new sites per year. While nature reserves can help to protect valuable habitats, sites or species, this alone is not enough to safeguard biodiversity. Espoo still has valuable nature outside protected areas. Less natural areas have many important functions: they provide ecosystem services, create ecological connectivity and provide habitats for many species. Therefore, in addition to the establishment of protected areas, the city is taking into account nature conservation as a whole, for example by ensuring ecological connectivity between areas.</p> <p>While conserving and protecting natural and green areas both within and outside the city's nature reserves is of foremost value, technical green structures such as green roofs, decks and green walls are an important additional way of increasing urban greening in dense urban centres. Espoo promotes the construction of green roofs and steers their design and implementation as a part of town planning, plot conveyance and building permit processes. We also analyse the possibilities of restoring habitats and increase the amount of protected natural areas.</p>
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		Espoo is supporting businesses in integrating science-based targets for nature through building a new nature-themed business and research network with the aim of increasing the private sector's contribution towards the restoration and conservation of biodiversity.
Reference to impact pathway	Field of action	Green infrastructure and nature-based solutions
	Systemic lever	Governance and policy Regulation Technology and infrastructure Citizen engagement and participation Capacity and capability development Local development strategies
	Outcome (according to module B-1.1)	Nature-wise Espoo roadmap defines biodiversity preservation methods and actions. Including established pathways for no net loss and greenspace preservation and recovery. The city organisation, residents, associations, businesses and landowners increased contribution towards the restoration and conservation of biodiversity. Introducing more technical green structures such as green roofs, decks and green walls in urban environments
Implementation	Responsible bodies for implementation	City of Espoo Timeline: 2023-2030
	Action scale & addressed entities	Local / regional Natural and built areas
	Involved stakeholders	Universities and research institutions Residents, associations and landowners Businesses Ministry of the Environment
Impact & cost	GHG emissions reduction estimate (total) per emission source sector	Affects other emission sources, no direct emission reductions on scope 1 and 2 emissions.
	Total costs and costs by CO2e unit	Total costs : 2 0124 k€

B-2.3: Summary strategy for residual emissions

Espoo's climate neutrality target, as approved by the city council, is defined as an 80 % reduction in emissions by 2030 compared to 1990 level. The aim is that the remaining 20 % can be sequestered in carbon sinks. Carbon sinks are growing carbon stocks, such as growing forests.

Based on Climate-neutral Espoo emission reduction scenario estimating the impacts of measures that have been co-developed between the city and key stakeholders, if all actions are completed, Espoo would achieve in 2030:

- 72% reduction compared to 1990 emissions
- 65% reduction compared to 2022 emissions

In summer 2023, the city developed a new scenario and analysis based on updated data and possible additional actions identified during the CCC preparation. Based on this, the city could achieve in 2030:

- 80% reduction compared to 1990 emissions
- 78% reduction compared to 2022 emissions

The remaining emissions are difficult to tackle and relate in particular to emissions from transport, logistics and private energy use, i.e. they are emissions related to consumption and individual choices that require even more collaboration with citizens and stakeholders and development of national and EU-level regulation. There needs to be a behavioural change and education to succeed in the sustainability transition. These are part of our Action Plan (A-3.3).

The amount of carbon sinks in Espoo was studied in 2021. Espoo's soil and vegetation carbon stocks and their growth, or carbon sinks, are at a relatively high level compared to many other European cities. The largest carbon stocks and sinks are in forest soils and vegetation. Forests, covering nearly 60 % of the city's surface area, and protected areas are important carbon sinks for Espoo. According to the study, Espoo's carbon sinks were large enough to absorb 2030 greenhouse gas emissions, if they can be brought down to the target of 80% below 1990 levels. In other words, the sink would correspond to a remaining carbon sequestration of about 20%.

However, maintaining this high level of carbon sinks in the Espoo region will be challenging as the city grows and urbanises. Espoo's population is growing by an average of approximately 4,700 inhabitants per year. Growth will be directed mainly to already built-up areas, especially in city centres, and along good public transport connections. Densifying the spread out city structure will promote the use of sustainable transport modes and thus help reducing emissions from transport. In this way, even in a growing city, emissions can be reduced as much as possible while preserving a large proportion of carbon sinks and stocks.

The adequacy of carbon sinks is one part of land use development. Carbon sinks are being addressed as part of Espoo's master plan 2060 currently under development. The knowledge base on the amount and development of carbon sinks is constantly being refined and Espoo is actively involved in the development work.

In addition to city-wide inventories and actions, it is important to address the issue of preserving sufficient carbon sinks and possible carbon sequestration on national and regional level. Finland will inevitably incur a significant emissions debt in the 2020s, and sinks are in danger of falling short of targets. According to Prime Minister Orpo's Government Programme 2023, the national government will influence the climate through effective emission reduction measures, increased carbon sinks and clean economy solutions. On the other hand, forestry is viewed from many perspectives in the government programme and maintaining the sufficiency of natural carbon sinks is challenging. The programme states that the government will actively promote the large-scale deployment of technological sinks in Europe and Finland, and that the government will set a target for significant deployment of technological sinks already in the 2020s. The government also aims to enable voluntary carbon reduction and carbon sequestration markets to operate in an incentive-based and transparent manner.



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

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

B-3.1: Impact Pathways					
Outcomes/ impacts addressed	Action/ project	Indicator No.	Indicator name	Target values (year)	Recent value (year)
<p>Implementation of Espoo Clean Heat roadmap continues and is completed by 2030. Coal burning has been given up completely. Recycling waste heat from Microsoft's data centre region provides 40 % of the consumed heat.</p> <p>More renewable and circular energy sources (e.g. solar, wind and geothermal energy, excess heat) are used in private and public buildings</p> <p>Better infrastructure for sustainable transport modes and EV's. Development of walking and cycling network. Increased number of EV charging points and electric vehicles</p> <p>Better accessibility of public transport and low-emission bus fleet.</p> <p>Carbon-neutral water services and waste management by 2030</p>	<p>E1: Espoo Clean Heat - replacing fossil fuels in district heating</p> <p>E2: Reducing emissions in electricity consumption, oil heating and industrial fuels of housing, industry, and services</p> <p>M3: Reducing emission of car traffic</p> <p>W1: Reducing emissions from waste treatment</p>	1	GHG emissions per capita in Espoo area	0,6 t CO2e (2030)	3,0 t CO2e (2022)
<p>Buildings have carbon footprint limits and new buildings have smaller carbon footprints. Costs and carbon footprint of construction projects assessed considering entire life cycle of buildings leading to more climate-wise and cost-effective solutions.</p>	<p>B2 : Promoting low-carbon construction and emission-free work sites</p> <p>W2: Promoting circular solutions</p>	2	GHG consumption based (scope 3) emissions per capita in Espoo	Target value will be identified in the later steps of CCC process.	9,07 t CO2e (2022)



<p>Guidance on low-carbon building provided to citizens and developers.</p> <p>Espoo implements the voluntary National green deal agreement towards emission-free construction sites. No fossil fuels are used on city's own construction sites after 2025.</p> <p>Food served at schools, daycare centres and other city facilities increasingly climate-friendly encouraging citizens to also make sustainable food choices in their daily lives.</p> <p>Children and youth growing up with circularity mindset.</p> <p>Increased number of sustainable purchase criterias in public procurement. New circular business models.</p>					
<p>Implementation of Espoo Clean Heat roadmap continues and is completed by 2030.</p> <p>District heating production by Fortum:</p> <ul style="list-style-type: none"> Industrial-scale air-to-water heat pumps and additional electric boilers Additional electric boilers Microsoft data center construction and operations begin Suomenoja last coal unit closes at the latest in 2025 Recycling waste heat from Microsoft's data centre region provides 40 % of the consumed heat <p>Developing a smarter and more flexible power grid to enable increased electricity use in district heating (Caruna)</p>	<p>E1: Espoo Clean Heat - replacing fossil fuels in district heating</p> <p>E4: Enabling the increased electrification</p>	<p>3</p>	<p>Non-fossil fuels in district heating</p>	<p>85 % (2026) 95 % (2029)</p> <p>Due to security of supply, there will be some natural gas capacity left. This share will be compensated by Fortum.</p>	<p>48 % (2022)</p>
<p>Increased number of EV charging points and electric vehicles. Guidelines for EV charging points in the city</p> <p>Parking concessions for EVs. Low emission lane on the main highway</p>	<p>M3: Reducing emission of car traffic</p> <p>E4: Enabling the increased electrification</p>	<p>4</p>	<p>Electric and hybrid cars (total share / new registrations)</p>	<p>Total share: 25 % (2025)</p> <p>New registrations: 80 % (2025)</p>	<p>Total share: 14,8 % (2023)</p> <p>New registrations: 60 % (2023)</p>



<p>EV charging available in Espoon Asunnot housing. Housing associations are aware of benefits on installing EV charging infrastructure.</p> <p>Developing a smarter and more flexible power grid to enable increased uptake of e-mobility (Caruna)</p>					
<p>Increasing the production of solar electricity</p> <p>Households' and businesses' investments in sustainable energy solutions such as solar panels and geothermal energy encouraged by sharing information highlighting both economic and environmental benefits.</p> <p>Establishing a solar community in Espoo is made easy by online portal. More energy and solar communities that produce their own energy and feed surplus energy into the electricity grid.</p> <p>10 % of the city's new buildings' energy consumption is produced with renewable energy produced on site (solar electricity, geothermal heat, wind power).</p>	<p>E2: Reducing emissions in electricity consumption, oil heating and industrial fuels of housing, industry, and services</p> <p>E3: Energy optimization and energy savings in city-owned buildings</p> <p>E4: Enabling the increased electrification</p>	5	Solar panel systems	2015 solar panel systems (2025)	1910 systems (2022)
<p>Recycling rates for municipal and household waste reach 60 % by 2025.</p> <p>Reduce the amount of mixed waste down to 100 kg per capita by 2025 and 85 kg per capita by 2030.</p> <p>Waste management regulations improve sorting opportunities:</p> <ul style="list-style-type: none"> • Biowaste sorting expanded to properties with 1-4 households. • Plastic, glass and carton packages as well as small metal items collected from all properties with at least 5 apartments. 	<p>W1: Reducing emissions from waste treatment</p> <p>W2: Promoting circular solutions</p>	6	Household waste recycling rate Amount of mixed waste / capita	60 % (2025) 100 kg / capita (2025) 85 kg / capita (2030)	48 % (2021) 133 kg / capita (2021)



Improved sorting opportunities at schools and other city facilities and private households.					
<p>New circular business models.</p> <p>Circular economy green deal identifies and implements common goals, common rules, common criteria and most impactful actions.</p> <p>Increased number of sustainable purchase criterias in public procurement.</p> <p>Co-creation of city districts with different stakeholders; city as an orchestrator and platform.</p> <p>Kera and Finnoo districts developing as forerunners of smart, low-carbon and circular city development. Similar innovative incentives and commitments applied to other Espoo city districts under development.</p> <p>Joint solution pathways in four RAKKE ecosystems implemented and developed further with 100 local business and research partners.</p>	<p>W2: Promoting circular solutions</p> <p>B1: Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions</p>	7	Circular and sharing economy companies in Espoo	1500 companies (2030)	142 companies (2022)
Carbon-neutral water services and waste management by 2030	W1: Reducing emissions from waste treatment	8	Household water consumption	Target value will be identified in the later steps of CCC process.	130 litres/day/capita
<p>Espoo has identified 23 sites to become nature reserves by 2030, at the rate of three new sites per year.</p> <p>A total of about 390 hectares of new nature reserves by 2030 (23 new sites)</p> <p>Steering construction to existing centres to conserve carbon sinks</p>	G2: Fostering biodiversity and nature-based solutions in urban development	9	Protected natural areas	8,7 % (2030)	7,5 % (2022)



<p>More renewable and circular energy sources (e.g. solar and geothermal energy, excess heat) are used by the city, households and companies leading to improvement in air quality, reduced energy poverty and improved resiliency.</p> <p>Improved accessibility of public transport and sustainable mobility modes. Urban centres design and construction promotes a walkable city. Half of 2050 high-quality target network for cycling ready by 2030 (60 km).</p> <p>Improved EV charging infrastructure in city-owned buildings, housing companies and other public and private buildings encourages the uptake of e-mobility.</p> <p>More attractive and pleasant urban environments. Built environment and public transport are accessible for all, including the disabled and the elderly. New methods used to make climate-neutral transformation beautiful, inclusive and sustainable.</p> <p>Sustainably built and maintained high-quality streets, parks, homes, workplaces, schools, and kindergartens are at the heart of a healthy and safe everyday life.</p> <p>Reduction of waste management costs of private households and businesses.</p> <p>Nature-wise Espoo roadmap defines biodiversity preservation methods and actions. Including established pathways for no net loss and greenspace preservation and recovery.</p> <p>Better understanding and knowledge on carbon sinks enables the city to plan holistically sustainable carbon measures that take into account the values of different green</p>	<p>E2: Reducing emissions in electricity consumption, oil heating and industrial fuels of housing, industry, and services</p> <p>M1: Promoting walking and cycling</p> <p>M2: Promoting the shift to and reducing emissions of public transport</p> <p>B1: Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions</p> <p>G1: Directing city growth to built-up areas and preserving carbon sinks</p> <p>G2: Fostering biodiversity and nature-based solutions in urban development</p>	<p>10</p>	<p>Quality of life</p>	<p>Target value will be identified in the later steps of CCC process.</p>	<p>60,9 % (2020, 2022 will be published soon)</p>
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<p>spaces and green structures, as well as the role of vegetation and soils in the carbon balance</p> <p>Sufficient and accessible recreational green areas and services. Sufficient ecosystem services</p> <p>Environments better adapted to and combating adverse effects of climate change (e.g. floods, drought, urban heat island effect).</p>					
<p>Active energy citizenship is increased. Citizens are aware of their household's energy issues, motivated to save energy and invest in sustainable energy.</p> <p>Energy transition creates opportunities for new roles for residents and the forming of energy communities. Energy communities create a forum for knowledge-sharing and help in forming new habits that promote a more sustainable lifestyle.</p> <p>Teaching adults bicycling and maintenance skills and boosting bicycle-related business.</p> <p>Schools encouraging students to use sustainable mobility modes, teaching energy citizenship and energy savings. Children and youth growing up with circularity mindset.</p> <p>Communication to diverse target groups to encourage sustainable mobility choices in everyday life.</p> <p>Improved sorting opportunities at schools and other city facilities and private households.</p> <p>Food served at schools, daycare centres and other city facilities increasingly climate-friendly encouraging citizens to also make sustainable food choices in their daily lives.</p> <p>Events organised in Espoo adhere to principles of circularity.</p>	<p>E2: Reducing emissions in electricity consumption, oil heating and industrial fuels of housing, industry, and services</p> <p>M1: Promoting walking and cycling</p> <p>M2: Promoting the shift to and reducing emissions of public transport</p> <p>M3: Reducing emission of car traffic</p> <p>B2: Promoting low-carbon construction and emission-free work sites</p> <p>W2: Promoting circular solutions</p> <p>G1: Directing city growth to built-up areas and preserving carbon sinks</p>	<p>11</p>	<p>Pro environmental identity</p>	<p>Target value will be identified in the later steps of CCC process.</p>	<p>60 % (2023)</p>



<p>Promoting citizens to take care of their environment and biodiversity that supports healthier ecosystems and carbon sinks.</p>	<p>G2: Fostering biodiversity and nature-based solutions in urban development</p>				
<p>Systemic participation of citizens in city planning and services through Espoo participation model</p> <p>Sustainable Espoo resident participation group strengthens the resident-based approach and their inclusion in Espoo's sustainable development work.</p> <p>Active energy citizenship is increased. Active citizen promotion of biodiversity. Children and youth growing up with circularity mindset.</p> <p>Virtual platforms enable observing alternative design solutions contributing towards sustainable urban districts. Digital platforms enable dialogue with residents to understand specific needs such as requirements of individuals with reduced mobility when developing city districts. My Espoo on the Map survey becomes an established part of the initial data for urban planning and is updated regularly.</p>	<p>Cross-cutting topic</p>	<p>12</p>	<p>Voter participation</p>	<p>Target value will be identified in the later steps of CCC process.</p>	<p>58,2 % (2021)</p>
<p>Popularity and accessibility of public transport, walking and cycling grown</p> <p>Compiling a map of special accessibility areas to share information with city planners.</p> <p>Collaboration with NGO's and cycling community.</p> <p>Teaching adults bicycling and maintenance skills and boosting bicycle-related business.</p> <p>Schools encouraging students to use sustainable mobility modes.</p>	<p>M1: Promoting walking and cycling</p> <p>M2: Promoting the shift to and reducing emissions of public transport</p>	<p>13</p>	<p>Share of sustainable transport modes</p>	<p>60 % (2025)</p>	<p>53 % (2021)</p>



<p>Communication to diverse target groups to encourage sustainable mobility choices in everyday life.</p>					
<p>More energy and solar communities that produce their own energy and feed surplus energy into the electricity grid.</p> <p>Energy transition creates opportunities for new roles for residents and the forming of energy communities. Active energy citizenship is increased. Establishing a solar community in Espoo is made easy by online portal.</p> <p>National regulation on energy communities developed to enable decentralised energy communities to participate in the energy market.</p> <p>More renewable and circular energy sources (e.g. solar and geothermal energy, excess heat) are used by households and companies.</p> <p>Energy communities create a forum for knowledge-sharing and help in forming new habits that promote a more sustainable lifestyle.</p>	<p>E2: Reducing emissions in electricity consumption, oil heating and industrial fuels of housing, industry, and services</p>	<p>14</p>	<p>Energy communities in Espoo</p>	<p>15 (2025)</p>	<p>9 (2023)</p>
<p>Protection of green areas and infrastructure to prevent deforestation and to save carbon sinks and storages. Sufficient and accessible recreational green areas and services.</p> <p>Better understanding and knowledge on carbon sinks enables the city to plan holistically sustainable carbon measures that take into account the values of different green spaces and green structures.</p> <p>New Master Plan 2060 guides the development of climate-smart city of networks.</p> <p>Nature-wise Espoo roadmap defines biodiversity preservation methods and actions. Including established</p>	<p>G1: Directing city growth to built-up areas and preserving carbon sinks</p> <p>G2: Fostering biodiversity and nature-based solutions in urban development</p> <p>B1: Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions</p>	<p>15</p>	<p>Reachability of green area or recreation area</p>	<p>Target value will be identified in the later steps of CCC process.</p>	<p>96.8% of Espoo residents live within 300 metres of a green/recreational area of at least 1 ha</p> <p>98.2% of Espoo residents live within 700 metres of a green/recreational</p>



<p>pathways for no net loss and greenspace preservation and recovery.</p> <p>Built environment and public transport are accessible for all, including the disabled and the elderly.</p>					<p>area of at least 1 ha</p> <p>(2021)</p>
<p>Improved accessibility of public transport and sustainable mobility modes. Urban centres design and construction promotes a walkable city.</p> <p>Better infrastructure for sustainable transport modes and EV's.</p> <p>Protection of green areas and infrastructure to prevent deforestation and to save carbon sinks and storages.</p>	<p>M1: Promoting walking and cycling</p> <p>M2: Promoting the shift to and reducing emissions of public transport</p> <p>M3: Reducing emission of car traffic</p> <p>B1: Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions</p> <p>G1: Directing city growth to built-up areas and preserving carbon sinks</p>	<p>16</p>	<p>Percentage of yearly approved floor square metres for residential use in (MAL housing and transport agreements) primary land use zone.</p>	<p>Maintaining the same level; above 90 %</p>	<p>91 % (2021)</p>

B-3.2: Indicator Metadata	
Indicator Name	GHG emission per capita in Espoo area
Indicator Unit	CO2 equivalent tons
Definition	Amount of greenhouse gas emissions per capita within city boundary
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Heating, consumer electricity, transport, waste treatment, agriculture, industry and work machinery
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Energy systems Transport and mobility Waste and circular economy
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Helsinki Region Environmental Services HSY
Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	VLR, Sustainable Espoo development programme

B-3.2: Indicator Metadata	
Indicator Name	GHG consumption based (scope 3) emissions per capita in Espoo
Indicator Unit	CO2 equivalent tons
Definition	Amount of consumption based (scope 3) greenhouse gas emissions per capita in Espoo
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Energy consumption, construction, transportation, food, goods and services
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Energy systems Transport and mobility Built environment Waste and circular economy

Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Sitowise Oy together with the Natural Resources Institute Finland (KULMA)
Expected availability	Good
Suggested collection interval	Bi-yearly
References	
Other indicator systems using this indicator	VLR, Kulma-project

B-3.2: Indicator Metadata	
Indicator Name	Non-fossil fuels in district heating
Indicator Unit	Percentage
Definition	Use of non-fossil fuels compared to all used fuels in district heating in Espoo-Kauniainen-Kirkkonummi area
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Energy / district heating
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Energy solutions
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	N/A
Data requirements	
Expected data source	Fortum Oyj
Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	Espoo Clean Heat

B-3.2: Indicator Metadata	
Indicator Name	Electric and hybrid cars (total share /new registrations)
Indicator Unit	Percentage (of all vehicles / new registrations)
Definition	Total share of electric and hybrid cars and share of new registrations of electric and hybrid cars compared to total registrations in Espoo area
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes

If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Transport & mobility
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	N/A
Data requirements	
Expected data source	Statistics Finland
Expected availability	Good
Suggested collection interval	Yearly (monthly)
References	
Other indicator systems using this indicator	Sustainable Espoo Programme, VLR

B-3.2: Indicator Metadata	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	Solar panel systems
Indicator Unit	Number #
Definition	Number of solar panel systems attached to electric network by the end of the year in Espoo area
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Energy systems
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Energy systems
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	N/A
Data requirements	
Expected data source	Caruna Oy
Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	VLR, Sustainable Espoo development programme

B-3.2: Indicator Metadata	
Indicator Name	Household waste recycling
Indicator Unit	Percentage
Definition	Amount of household waste recycled compared to total amount of household waste
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Waste treatment
Does the indicator measure indirect impacts (i.e. co- benefits)?	No
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Waste & circular economy
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	N/A
Data requirements	
Expected data source	Helsinki Region Environmental Services HSY
Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	VLR, Sustainable Espoo development programme

B-3.2: Indicator Metadata	
Indicator Name	Circular and sharing economy companies in Espoo
Indicator Unit	Number #
Definition	Number of companies situated in Espoo whose business is at least partly based on circular and sharing economy
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Local job and value creation Green & digital transition of local economy Business opportunities for SMEs
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Circular economy & waste
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No

Data requirements	
Expected data source	City of Espoo / Centre of Excellence for Sustainable development
Expected availability	Moderate
Suggested collection interval	Yearly / bi-annually
References	
Other indicator systems using this indicator	VLR, Sustainable Espoo development programme

B-3.2: Indicator Metadata	
Indicator Name	Household water consumption
Indicator Unit	Liters/capita/day
Definition	How many liters in average one person uses water per day
Indicator Context	
Does the indicator measure direct impacts (i.e. No reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Resource efficiency
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Waste & circular economy
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	N/A
Data requirements	
Expected data source	Helsinki Region Environmental Services HSY
Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	VLR

B-3.2: Indicator Metadata	
Indicator Name	Protected natural areas
Indicator Unit	Percentage
Definition	Area of protected areas compared to total area in Espoo, including sea area
Indicator Context	
Does the indicator measure direct impacts (i.e. No reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Sufficient and accessible recreational green areas and services

	<p>Sufficient ecosystem services</p> <p>Habitats for local wildlife, including many endangered species</p> <p>Ecological connectivity</p> <p>Additional co-benefits:</p> <p>Benefits to physical and mental health</p> <p>Improved resiliency</p>
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Green infrastructure and nature-based solutions
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	N/A
Data requirements	
Expected data source	City of Espoo
Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	VLR

B-3.2: Indicator Metadata	
Indicator Name	Quality of life
Indicator Unit	Percentage
Definition	Percentage of adult people in Espoo who rate their quality of life (EuroHIS-8) as good
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Quality of life
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	<p>Energy systems</p> <p>Mobility & transport</p> <p>Built environment</p> <p>Green infrastructure and nature-based solutions</p>
Data requirements	
Expected data source	The Finnish Institute for Health and Welfare
Expected availability	Good
Suggested collection interval	Bi-yearly
References	
Other indicator systems using this indicator	VLR

B-3.2: Indicator Metadata	
Indicator Name	Pro environmental identity
Indicator Unit	Percentage
Definition	Percentage of people in Espoo who agree with the following statement: <i>In my everyday life I try to act as environmentally friendly as possible</i>
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Adoption of climate-friendly lifestyle
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Energy systems Mobility & transport Waste & circular economy Built environment Green infrastructure and nature-based solutions
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Attitudes towards environment in Helsinki region research.
Expected availability	Moderate
Suggested collection interval	Every four years
References	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata	
Indicator Name	Voter participation
Indicator Unit	Percentage
Definition	Percentage of people voting in municipal election
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Democracy and active citizenship
Can the indicator be used for monitoring impact pathways?	No
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data	Ministry of Justice

source	
Expected availability	Good
Suggested collection interval	Every four years

B-3.2: Indicator Metadata	
Indicator Name	Share of sustainable transport modes
Indicator Unit	Percentage
Definition	Percentage of travels made by inhabitants of Espoo with sustainable means of transport (walking, bicycle, public transport) compared to all travels made by inhabitants of Espoo
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	Yes, indirect component in transport emissions calculations
If yes, which emission source sectors does it impact?	Transport
Does the indicator measure indirect impacts (i.e. co-benefits)?	Yes
If yes, which co-benefit does it measure?	Adoption of climate friendly lifestyle
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Mobility and transport: M1 Promoting walking and cycling M2: Promoting the shift to and reducing emissions of public transport
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Helsinki Region Transport Travel Survey
Expected availability	Good
Suggested collection interval	Every sixth year (whenever the research is conducted)
References	
Other indicator systems using this indicator	Sustainable Espoo development programme, VLR

B-3.2: Indicator Metadata	
Indicator Name	Energy communities in Espoo
Indicator Unit	Number #
Definition	Number of energy communities in Espoo. An energy community allows the electricity produced (e.g. by housing company with solar panels) to be used for the benefit of dwellings and commercial premises as well.
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No

Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Active citizenship Increased understanding of energy Improved sense of community Reduced dependency on energy imports Reduction in energy bills of households and industry Green & digital transition of local economy
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Energy Systems: E2 Reducing emissions in electricity consumption, oil heating and industrial fuels of housing, industry, and services
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Caruna Oy
Expected availability	Good
Suggested collection interval	yearly
References	
Other indicator systems using this indicator	Sustainable Espoo development programme

B-3.2: Indicator Metadata

Indicator Name	Reachability of green area or recreation area
Indicator Unit	Percentage
Definition	Percentage of inhabitants of Espoo living in max 300-meter distance from green/recreation area with an area at least 1 hectare.
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	Sufficient and accessible recreational green areas and services Additional co-benefits: More attractive and pleasant urban environments Liveable and resilient way of life Adoption of nature- and climate-friendly lifestyles Benefits to physical and mental health
Can the indicator be used for monitoring impact pathways?	Yes

If yes, which NZC impact pathway is it relevant for?	Green infrastructure & nature-based solutions G1: Directing city growth to built-up areas and preserving carbon sinks G2: Fostering biodiversity and nature and based solutions in urban development; Build Environment B1: Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Six Biggest Cities ecological indicators
Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	Sustainable Espoo development programme

B-3.2: Indicator Metadata	
Indicator Name	Percentage of yearly approved floor square metres for residential use in (MAL housing and transport agreements) primary land use zone.
Indicator Unit	%
Definition	Yearly approved detailed plans in City of Espoo. Percentage of yearly approved floor square metres for residential use in primary land use zone. Primary land use zones are defined in The Helsinki region land use, housing and transport plan MAL, which is a strategic plan for the 14 municipalities in the Helsinki region.
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	No
Does the indicator measure indirect impacts (i.e. co- benefits)?	Yes
If yes, which co-benefit does it measure?	More liveable city Sufficient and accessible recreational green areas and services
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Built environment Transport and mobility Green infrastructure & nature-based solutions
Is the indicator captured by the existing CDP/SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Approved detailed plans from City of Espoo



Expected availability	Good
Suggested collection interval	Yearly
References	
Other indicator systems using this indicator	MAL agreements



6 Part C – Enabling Climate Neutrality by 2030

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

6.1 Module C-1 Organisational and Governance Innovation Interventions

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

C.1.1: Enabling organisational and governance interventions					
Intervention name	Description	Responsible entity/ dept./ person	Involved stakeholder	Enabling impact	Co-benefits
(indicate name of intervention)	(describe the substance of the intervention)	(indicate responsible)	(list all stakeholder involved and affected)	(describe how intervention enables climate neutrality)	(indicate how intervention helps achieve impact listed in Module B-1)
EU level					
Cities for Sustainability Governance (CSG) Network (Urbact)	A network of 9 European cities led by the City of Espoo and reaching for the better integration and mainstreaming of the holistic sustainability framework of UN’s Agenda 2030 and its 17 Sustainable Development Goals to the work of cities.	Lead partner City of Espoo; Centre of Excellence for Sustainable Development (Mayor’s Office)	City administration, citizens, private sector, 3rd sector, academia	Builds capacity in the city organisations and stakeholders of taking sustainability into account in a holistic and integrated manner. Helps to integrate sustainability to the city structures, processes, working culture and mindsets.	Empowered people are motivated to develop their work to be more sustainable. Increased understanding of co-benefits of climate action within the city organisation
Intelligent Cities Challenge	Espoo is a mentor city in ICC 2023-25 supporting European cities towards the green and digital	European Commission	ICC core cities Local experts	Sharing city best practices and co-learning with the EU community. Espoo’s	Green & digital transition of local economy



	transition of their local economies, through Local Green Deals.	In Espoo: Centre of Excellence for Sustainable Development (Mayor's Office)		focus in 2023-25 challenge is the mobility and transport sector, where new green and digital solutions are still needed to speed up the low-carbon transition.	Sustainable competitiveness Quality of life
CrAft Cities supporting New European Bauhaus (NEB)	Espoo is part of CrAft reference cities network and will benefit and learn from the project's guidance and pathways in developing climate neutral, beautiful and inclusive cities in line with the New European Bauhaus (NEB) initiative.	CrAft project 8 lead partners across Europe In Espoo: Centre of Excellence for Sustainable Development (Mayor's Office)	Citizens, policymakers, arts and academia	Sharing models and building capacities in making the cities' climate-neutral transformations beautiful, inclusive and sustainable.	Accessibility Liveable and resilient way of life Spatial quality More beautiful, inclusive and sustainable built environment
UIREKA SHIFT European University Alliance	UIREKA SHIFT (Sustainable, Human, Inclusive, Future-proof Transition) aims to establish a long-term strategic and structural collaboration to integrate education and research into a European University with a specific focus to contribute to a sustainable, human, inclusive and future proof transition to Climate-Neutral and Smart Cities.	Metropolia University of Applied Sciences	Cities of Espoo, Helsinki and Vantaa and the Helsinki-Uusimaa Regional Council	Promoting challenge-based and collaborative learning and innovation; and educating future-proof urban professionals who will accelerate the transition towards climate-neutral and smart cities.	Inter-organisational collaboration and co-creation Shared understanding of challenges Future skilled professionals
Circular Cities Declaration	The Circular Cities Declaration is a commitment from European cities and regions to use the levers at our disposal coherently across the organisation to transition from a linear to a circular economy. Espoo signed the commitment in 2020 and follows its ten objectives	ICLEI Europe In Espoo: Centre of Excellence for Sustainability, Mayor's Office	City units, schools, libraries Circular businesses Research, development and innovation actors	Circular Cities Declaration provides a systemic framework to promoting circular economy in the city with residents and stakeholders. Circular transition is one of the key way to reach climate goals	Green & digital transition of local economy Local job and value creation Resource efficiency



	to promote systemic development of circular solutions.			in sectors that have large environmental impact and resource demand.	Reduced need of virgin raw materials
Partnership for Regional Innovation (PRI) Pilot Action	Partnerships for Regional Innovation (PRI) builds on positive experiences with smart specialisation strategies (S3). The ambition is to test tools for better coordination and directionality of regional, national and EU innovation policies towards implementation of the twin transition and tackling the innovation divide in the EU.	The European Committee of the Regions (CoR) and European Commission's Joint Research Centre (JRC) In Espoo: Strategy and Development Unit (Mayor's Office)	Research, development and innovation actors Other European cities	Developing and sharing local strategic policy framework dealing with innovation, industrial development, sustainability transitions and broader economic and social development.	Green & digital transition of local economy
National level					
Climate Mission Finland 2030 national network	National network that brings together six Finnish Mission Cities, national government, and key institutions to identify joint challenges and solutions.	Espoo, Helsinki, Tampere, Turku, Lahti and Lappeenranta Ministry of the Environment Ministry of Economic Affairs and Employment Ministry of Transport and Communications	Business Finland Association of Finnish Local and Regional Authorities Other Finnish cities with high climate ambition	National coordination, support and co-learning for climate-neutral and smart cities by 2030.	Inter-organisational collaboration and co-creation Shared understanding of challenges and opportunities
Decarbonized Cities Programme	Encouraging companies to develop internationally successful solutions for the carbon-neutrality challenges of selected partner cities. The largest challenges in urban environments are related to	Business Finland In Espoo: Centre of Excellence for Sustainable	Finnish start-ups, SMEs, and large companies Finnish and non-Finnish partner cities	The program will enhance and fund the creation of cross-sectoral solutions and offerings that cities need to reduce their CO2 emissions and to speed-	Local job and value creation Increased private investment



	the built environment, energy, and traffic.	Development (Mayor's Office)	Finnish research institutes, universities, and universities of applied sciences Finnish organizations in the field of public administration International financiers of large projects	up their energy transition. Cities in Finland and abroad can have a role as testing and reference platforms.	Green & digital transition of local economy
Circular Economy Green Deal	The Circular Economy Green Deal boosts society's transition to circular economy. It identifies key measures to promote a low-carbon circular economy consisting of common frameworks, criteria, and commitments. It is currently constructed in multilevel co-operation and will be based on scientific scenarios that are unique in terms of scope and coverage. The City of Espoo is one of 76 actors involved in the preparation of joint action and scenarios. Implementation will begin in 2024.	Ministry of the Environment, Ministry of Economic Affairs and Employment In Espoo: Centre of Excellence for Sustainable Development (Mayor's Office)	Industries and companies Regions, cities, municipalities Research institutions	Identify common goals, common rules, common criteria and most impactful actions in six areas: 1. Resource-wise buildings 2. Circulating soil and rock materials 3. Resource-wise production and circulating materials 4. Sustainable consumption business and sharing economy 5. Resource-wise energy production 6. Renewing food chains	Local job and value creation Business opportunities for SMEs Resource efficiency Reduced need of virgin raw materials Liveable and resilient way of life Shared understanding of challenges and opportunities
Climate Leadership Coalition (CLC)	Climate Leadership Coalition is the largest non-profit climate business network in Europe. Espoo as well as many key companies, universities and research centers	Climate Leadership Coalition (CLC)	CLC has 96 organizational members: 66 companies, 9 universities, 5 trade organizations, 7 cities, 6	Together the network aims to make a significant positive climate impact through business solutions. The members	Green & digital transition of local economy



	<p>based in the city are active members of the network.</p> <p>CLC believes that profound transition to a sustainable world can be economically beneficial, viable and financeable. The network organizes regular theme group meetings for its members and makes policy proposals for governments and other stakeholders.</p>		<p>research institutions, 2 foundations and 1 trade union confederation.</p>	<p>strive to be among the leaders of their respective fields in terms of climate change mitigation ambition. Protecting the climate</p> <p>CLC encourages decision-makers to speed up the green transition and the green recovery by attracting investments via predictable and ambitious policies and systemic market-driven solutions.</p>	<p>Inter-organisational collaboration and co-creation</p> <p>Shared understanding of challenges and opportunities</p> <p>Business opportunities</p> <p>Local job and value creation</p> <p>Increased private investment to low-carbon solutions</p>
Regional level					
<p>Helsinki Region Land use, housing and transport agreements (MAL)</p>	<p>The agreements concerning land use, housing and transport are concluded by the State of Finland with the largest urban regions. The purpose of the agreements is to facilitate and support the cooperation between municipalities in urban regions and between municipalities and the State in the guidance related to the urban structure and coordination of land use, housing and transport.</p>	<p>Ministry of the Environment</p> <p>In Espoo: Urban Environment Sector</p>	<p>Cities and municipalities</p> <p>Ministry of Transport and Communications, Ministry of Economic Affairs and Employment, Ministry of Finance, Housing</p> <p>Finance and Development Centre of Finland (ARA), Finnish Transport Infrastructure Agency, Finnish Transport and Communications Agency Traficom, and the Centre for Economic</p>	<p>The main goal of the MAL 2023 planning is a climate-neutral, prosperous and successful Helsinki region. The MAL 2023 plan aims to build a region where current and future residents can live good lives and enjoy smooth everyday travel. The plan will also provide a sustainable solution to the region's growth and ensure good conditions for business and other activities. A sustainable transport system and the associated measures are essential to the plan.</p>	<p>Liveable and resilient way of life</p> <p>Sustainable, smooth, and accessible mobility choices</p> <p>Green & digital transition of local economy</p> <p>Improvement in air quality</p> <p>Sufficient and accessible recreational green areas and services</p>



			Development, Transport and the Environment		
Climate-neutral Helsinki-Uusimaa Region 2030	Helsinki-Uusimaa is aiming at climate neutrality by the year of 2030, in line with the forerunner cities such as Espoo, of the region. The urgent goal of climate neutrality is done in cooperation on a wide scale in all sectors; public, private and RDI and furthering shared projects. The climate actions are based on local strengths and the sharing of best practices.	Helsinki-Uusimaa Regional Council	Cities and municipalities Industries and companies Universities and research	Five climate spearheads for mitigation in Helsinki-Uusimaa are chosen as the most vital and urgent themes for climate neutrality: 6. Climate smart land use and construction 7. Smart and emission-free mobility 8. Fast and fair energy transition 9. Climate neutral circular economy 10. Together with sustainable consumption and production.	Green & digital transition of local economy Inter-organisational collaboration and co-creation Shared understanding of challenges and opportunities Local job and value creation
Local level					
Espoo Story	Espoo Story is the city strategy, a narrative created together with city employees, citizens, communities, and companies. This tool for strategic and participatory leadership was introduced in 2012 by the mayor and has since evolved and expanded. Espoo Story is based on a holistic understanding of sustainable development and outlines climate-neutrality by 2030 as one of the	Strategy and Development Unit (Mayor's Office)	Political leadership and elected members of city council City units, partner organisations such as universities, businesses and NGOs, citizens	Strategic commitment to climate-neutrality by 2030 approved City Council. Climate-neutrality as one of key targets for the whole city organisation. These targets guide the preparation of annual city budget and operational plans. Espoo Story highlights collaboration and working together with the whole community as a	Holistic understanding of sustainability Sustainable and resilient urban environments Green & digital transition of local economy



	seven key targets for the whole city organisation.			key strength and attribute of the city.	Holistic understanding of sustainability Active citizens
Climate Commitment Partnerships	We have sent an open invitation to our partners to jointly draft Espoo's Climate City Contract and join the effort with their own commitments towards climate-neutrality. The work began in March 2023 with mayor's invitation. With our stakeholders we are co-creating a working method to support climate work collaboration with key partners until 2030 and beyond.	Centre of Excellence for Sustainable Development (Mayor's Office)	Partner organisations representing business, education and research City sectors and units Sustainable Espoo Steering Group	Partner organisations that join Espoo Climate City Commitment sign the joint commitment document and commit to developing their own individual appendix within six months' time. The process to welcome new partners is continuous. A joint working method is being developed with partners and will include regular high and expert-level meetings and opportunities for co-creation.	Inter-organisational collaboration and co-creation Shared understanding of challenges and opportunities Green & digital transition of local economy Increased private investments to low-carbon solutions
Espoo Clean Heat roadmap and commitment	Espoo Clean Heat, provides a flagship example of efficient decarbonization and a transition to local self-sufficient heating on a large scale. Fortum and the City of Espoo have prepared a roadmap and signed a joint commitment to transformation that will result in carbon-neutral district heating by 2030.	Fortum City of Espoo	City units End-users of district heating : citizens, public and private sector	Espoo's district heating system is undergoing a major transformation to replace fossil fuels with smart and flexible solutions that are largely based on renewable electricity. The use of coal will be discontinued in 2025.	Inter-organisational collaboration and co-creation Shared understanding of challenges and opportunities Increased private investments to low-carbon solutions
Kera Development Commitment	The development commitment for Kera is a new urban development tool that directs operators in the new area to implement sustainable	Cross-sectoral committee with representation from Centre of	Real estate developers and land-owners	Through the commitment, operators are committed to close collaboration to create a climate-neutral	Innovative and scalable urban solutions



	development solutions in a long-term and collaborative manner aiming at climate-neutrality by 2030 and onwards.	Excellence for Sustainable Development, Building Control and City Planning.		area. Kera's carbon-neutrality roadmap supports the implementation of the commitment. The roadmap is a collection of impactful measures that fit with the themes of construction, energy and transport.	Sustainable competitiveness Attractive, liveable neighborhood Local job and value creation Increased private investments to low-carbon solutions
Voluntary Local Review (VLR)	The Voluntary Local Review assesses the city's operations, cross-administrative programmes and projects in relation to the 17 sustainable development goals of the UN's Agenda 2030 programme. Espoo's first VLR was conducted in 2020, next one in 2023 and the city is starting to plan for preparing VLR 2025 in a participatory process with different départements and stakeholders.	Centre of Excellence for Sustainable Development (Mayor's Office)	City departments, academia, businesses, NGOs, citizens Prime Minister's Office, tther cities in Finland and abroad, URBACT, UN Habitat	Builds capacity in the city organisations and stakeholders to understand the interconnected nature of sustainability targets.	Holistic understanding of sustainability Interconnectedness of local action to global goals
RAKKE – a solution path to sustainable growth ecosystems	Strengthens cooperation between the public and private sectors and promotes innovation and business activities in four key sectors: 1. low-carbon transport 2. energy 3.circular economy and 4. smart and clean urban solutions. Develops an ecosystem with shared targets and values with 100 companies and RDI actors.	Centre of Excellence for Sustainable Development (Mayor's Office)	Businesses and RDI actors City departments in Economic Development and Urban Environment Sector	With the help of a network-based approach, functional ecosystems are built promoting new business and growth. Joint "solution paths" are identified together with 100 companies and developers.	Green & digital transition of local economy Innovative and scalable solutions Sustainable competitiveness



<p>SPARCS co-creation model toolkit for smart and sustainable city</p>	<p>A toolkit to facilitate co-creation of a sustainable and smart urban area in cooperation with urban development stakeholders. Provides practical tools to develop regions to achieve sustainability goals and to mobilise a broad range of stakeholders in a systemic societal change. Developed in Espoo in 2022 as part of EU Horizon2020 SPARCS project.</p>	<p>Centre of Excellence for Sustainable Development (Mayor's Office)</p>	<p>City Planning Unit; Urban Environment Sector Land-owners, businesses, universities, RDI actors, citizens</p>	<p>A networked, multilateral way of working enables processing complex issues, such as sustainability and climate targets with a large number of stakeholders and vast scope of issues. Co-creation helps to develop user-oriented urban structures that are flexible during the regional lifecycle and better able to withstand the shocks in the operational environment.</p>	<p>Co-creation can produce not only ecologically sustainable and smart, but also community-based and active urban areas. Co-creation can also optimise public and private sector resources and act as a catalyst for the development of solutions by providing testbeds for innovation.</p>
<p>Internal</p>					
<p>Sustainable Espoo Programme</p>	<p>Cross-sectoral development programmes are Espoo's key instrument of breaking financial, administrative, and political silos to implement Espoo Story in tackling systemic issues such as climate change that no city department can solve alone. Sustainable Espoo is the longest running of the four programmes (in operation since 2013). It is owned by the Mayor. The programme's steering group has representation from all the political groups represented in the city council (9 people), the youth council and city officials from different city sectors (9 people).</p>	<p>Centre of Excellence for Sustainable Development (Mayor's Office)</p>	<p>The programme has developed collaborative methods between the city and different stakeholders, including companies, organizations, research institutions and universities, and citizens towards shared and common goals. Key partners have been actively involved in the preparation of programme planning. 200+ people participated in preparing the</p>	<p>The programme has its own yearly budget that is used as a seed funding to bring multiple times more resources from EU level, national, and private funding to support the climate and sustainability goals. The Steering Group is responsible for the good alignment of the project portfolio to steer systemic change. It also provides a place to discuss and tackle any potential political and practical controversies of the activities as well as a platform where rapid</p>	<p>The broad and representative composition aims to ensure consideration of the different perspectives of sustainable development and a comprehensive commitment to shared goals and their implementation.</p>



			programme plan in workshops and meetings.	learnings are gathered to inform and affect future policy making.	
Climate-neutral Espoo 2030 Roadmap and Climate budget	Climate-neutral Espoo 2030 Roadmap is being prepared and climate measures updated simultaneously with CCC process. Key targets and measures will be included in Espoo's annual budget to be approved by the City Council in December. Budget for year 2024 will include for the first time a separate climate budget to further strengthen the connection between the city financing and climate action. The climate budget will include all actions linked to the city budgeting and the climate mitigation and adaptation. Climate budget will be updated annually and roadmap every four years.	Centre of Excellence for Sustainable Development Finance and Economy Unit (Mayor's Office)	All city units City of Espoo Corporate Group Businesses, universities, research institutions, NGOs, citizens	Climate-neutral Espoo 2030 Roadmap and Climate budget are key instruments in operationalizing, managing and financing city's own climate action. Incorporating key measures and targets into city's annual budget ensures that climate action is mainstreamed into the planning, management and monitoring in all city units. Climate-neutral Espoo roadmap provides an overview, systemic pathways and commitments towards the 2030 goal.	Shared understanding of challenges and opportunities Improved energy-efficiency Reduced dependency on imported fossil fuels Green & digital transition of local economy
Espoo Climate Watch	The Climate Watch is an open website and platform compiling the city's climate mitigation and adaptation actions, monitoring their progress and evaluating their impact. It also includes a future forecasting tool with three scenarios for future emission reductions that help to assess the adequacy of adopted measures.	Environment Unit (Urban Environment Sector)	All city units and employees City of Espoo Corporate Group Decion-makers Citizens	Indicators are used to monitor the fulfilment of Espoo's climate goal and the distribution of emissions by sector. Precise indicators and monitoring enable the measures to be guided and developed where they are most impactful. An open web platform brings the information easily accessible to all city	Transparency Active citizenship Increased understanding of low-carbon solutions and lifestyles



				employees, stakeholders, political decision-makers, and citizens improving accountability and open governance.	
Sustainable Urban Mobility Plan (SUMP)	A Sustainable Urban Mobility Plan (SUMP) aims to increase walking, cycling and usage of public transport, the flexible flow of traffic and the use of fossil-free fuels for transportation. Currently in initial planning stage, the plan is to be developed in 2024 in cooperation between the city departments and in interaction with partners and residents.	Centre of Excellence for Sustainable Development (Mayor's Office)	City departments, especially City Planning, Public Works and Logistics Helsinki Regional Transport Authority (HSL)	Emissions related to transport and mobility will form the largest share of Espoo's future GHG emissions. SUMP will form a strategic and integrated approach to dealing with the complexity of urban transport and a key instrument to fostering low-carbon, accessible, safe and affordable mobility.	Sustainable, smooth, and accessible mobility choices Healthier citizens Reduced air and noise pollution Adoption of climate-friendly lifestyle
Climate action steering group	The internal climate action steering group lead by the Mayor unites directors of different units of the Mayor's Office and Urban Environment Sector relevant to the city organisations own climate action, including units responsible for city planning, public works, premises, logistics, environmental protection, procurement, finance, and sustainability.	Environment Unit (Urban Environment Sector) Centre of Excellence for Sustainable Development (Mayor's Office)	City departments	Climate action steering group ensures good alignment of climate action across city sectors and departments, follows up on the emission reductions and discusses needs of further actions.	Shared understanding of challenges and opportunities Improved capacities and capabilities to promote climate action
Mayor's Office Centre of Excellence for Sustainable Development	Created in 2021, the Centre of Excellence for Sustainable Development consists of 25+ experts supporting the city's sustainability goals and facilitating multi-level co-operation with the city organisation, Espoo community and diverse	Centre of Excellence for Sustainable Development (Mayor's Office)	Other city departments, city corporate group, affiliated companies and joint municipal authorities	Works as a transition team that coordinates and facilitates co-operation both within the city organisation and with diverse stakeholders. It helps to connect the different spheres of local	Improved capacities and capabilities to promote climate action Shared understanding of challenges and opportunities



	stakeholders. It forms part of the city's Strategy and Development unit also responsible for other cross-sectoral issues such as digitalization, research, international relations, immigration, participation and co-creation.		Businesses, universities, research institutions, RDI actors Citizens, NGOs National and regional authorities	governance and actors. Builds coalitions to apply for project funding and is responsible for multiple development projects, initiatives programmes and networks supporting the city's climate ambitions.	Local job and value creation Adoption of climate-friendly lifestyle
Public procurement	Developing procurement criteria and practices to support low-carbon, circular economy-oriented, and socially and environmentally sustainable solutions.	Procurement Unit, Centre of Excellence for Sustainable Development	Other city units, businesses National and regional authorities	The procurement activities of national, state and local governments are directly or indirectly responsible for 15% of global greenhouse gas emissions. Through public procurement the city has the ability to stimulate the development and adaptation of climate-friendly technologies and services. Public procurement will be a particularly important tool when addressing scope 3 emissions.	Improved energy-efficiency Green & digital transition of local economy Local job and value creation

6.2 Module C-2 Social and Other Innovation Interventions

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

C.2.1: Enabling social innovation interventions						
Intervention name	Description	Responsible entity/ dept./ person	Involved stakeholder	Enabling impact	Co-benefits	



(indicate name of intervention)	(describe the substance of the intervention)	(indicate responsible)	(list all stakeholder involved and affected)	(describe how intervention enables climate neutrality)	(indicate how intervention helps achieve impact listed in Module B-1)
Empowerment and inclusion					
Systemic participation of citizens in city planning and services through Espoo participation model	<i>From consultation to partnership</i> is the slogan that guides Espoo's approach and model to citizen participation. It describes the shift towards a more inclusive and participatory governance. Partnership-based participation gives residents a more active role as experts, partners and decision-makers.	Strategy and Development Unit (Mayor's Office)	All city departments and units Citizens, including groups such as youth and children, immigrant groups, elderly, and the disabled Third sector, NGOs	Participation is based on the Espoo story and its targets, including that of climate-neutrality. Resident participation is strengthened by moving away from one-off consultations towards ongoing and planned involvement and interaction in all city operations.	Increase citizens' confidence and ability to influence the development of the city and make better choices for climate in their daily lives Better well-being, health and functional capacity Social sustainability and democracy
Sustainable Espoo Resident Participation Group	In 2022, a new resident participation group was introduced to strengthen the direct links between residents and Sustainable Espoo Programme. Partner group that consists of 25 residents from diverse backgrounds meets regularly in facilitated co-design workshops focusing on different aspects of the city's sustainability work, including climate. The results of each discussion are brought to the steering group of Sustainable Espoo Programme.	Centre of Excellence for Sustainable Development (Mayor's Office)	Sustainable Espoo steering group Citizens, including groups such as youth and children, immigrant groups, elderly, and the disabled Other city sectors and units Private and third sector, NGOs	Strengthens the resident-based approach and their inclusion in Espoo's sustainable development work. The objective is to better integrate the voice of residents into the sustainable development work done by Espoo, to better view the goals from the residents' perspective.	Increase citizens' confidence and ability to influence the development of the city and make better choices for climate in their daily lives Residents gain new knowledge and skills to take back to their communities Social sustainability and democracy



<p>MyEspoo on the Map</p>	<p>My Espoo on the Map survey gathers experience-based data from citizens to be used in future city planning. First map-based survey carried out in autumn 2020 received responses from about 6,600 Espoo residents. Almost 70,000 marks of meaningful places and development ideas were made in total. The survey was conducted in collaboration with Aalto University's research team</p> <p>The aim is that the My Espoo on the Map survey will become an established part of the initial data for urban planning and that it will be updated regularly.</p>	<p>City Planning (Urban Environment Sector)</p> <p>Aalto University</p>	<p>Citizens, schools</p> <p>Other city sectors and units</p>	<p>Based on data by citizens, researchers will be able to find out, at a general level, e.g. what kind of environment increases the well-being and what should be prioritised in future urban planning. The Urban Planning Centre will use the results of the survey over the following years in both master planning and local planning. The material can also enrich future interaction with residents: the discussions at residents' meetings can deepen and verify the findings of the survey.</p>	<p>Active citizens</p> <p>Social sustainability and democracy</p> <p>Accessibility</p> <p>Liveable and resilient way of life</p>
<p>Espoo Youth council</p>	<p>The Espoo Youth Council consists of 40 young people aged 13 to 18. The Youth Council participates in the decision-making of the City of Espoo promoting young people's issues, bringing forward requests and expressing opinions on current issues. The Youth Council has the right to speak at and attend meetings of the City Board, the City Council and all city committees, including Sustainable Espoo Steering Group.</p>	<p>The activities of the Youth Council are coordinated by youth work coordinators from Espoo's Youth Services (Growth and Learning Sector)</p> <p>The members of the Youth Council are elected through an election every two years.</p>	<p>Youth, schools</p> <p>Decision-makers</p> <p>City departments and units</p> <p>City officials</p>	<p>Youth Council contributes by making statements, taking initiatives, stating positions and organising events. The aim is to raise young people's awareness of social activities and opportunities for influence in order to inspire them to follow current matters and actively influence them. Youth council has been active on sustainability and climate issues that</p>	<p>Increase young people's confidence and ability to influence the development of the city and make better choices for climate in their daily lives</p> <p>Active youth</p> <p>Social sustainability and democracy</p>



				have affect the future of young generations.	
Espoo Disability and Elderly Councils	<p>Espoo's Disability Council monitors and takes measures to promote the rights and opportunities of people with disabilities and long-term illnesses in Espoo. The council makes initiatives and proposals and issues statements and opinions.</p> <p>The Elderly Council serves as a guardian and advocate of the elderly in Espoo in municipal decision-making. The Elderly Council brings the perspective of the elderly Espoo residents to the city's services and city planning.</p>	<p>The activities of the Disability Council in Espoo are guided and monitored by the Disability Council Advisory Board, whose members include all disability and patient organisations in Espoo, 57 organisations in total.</p> <p>The Elderly Council promotes cooperation between the authorities, the elderly and organisations for pensioners and the elderly in the city.</p>	<p>Disabled and elderly citizens</p> <p>Decision-makers</p> <p>City departments and units</p> <p>City officials</p>	<p>The councils influence the planning, preparation and monitoring of the activities of the city's various divisions in matters of importance to disabled and older people's well-being, health, inclusion, living environment, housing, mobility or coping with daily activities, or in terms of the services they need.</p> <p>The Disability Council has established a special working group to ensure that the built environment and public transport are accessible for all.</p>	<p>Social sustainability and democracy</p> <p>Accessibility</p> <p>Liveable and resilient way of life</p>
Regulation and support					
Supporting capacity building of sports clubs, NGOs, and community groups in the field of sustainability and climate	<p>Supporting capacity building of sports clubs, NGOs, and community groups to help identifying and integration sustainability and climate actions.</p> <p>Concrete examples include Agenda 2030 Sustainable Development Goals (SDG) sense-making workshops for NGOs and working with sports clubs in their effort to become climate neutral (for</p>	<p>Sustainable Espoo Programme</p> <p>Centre of Excellence for Sustainability, Mayor's Office</p>	<p>Residents</p> <p>Civil society actors such as sports clubs, NGOs, and community groups</p> <p>Sustainable Espoo Steering Group</p>	<p>Helping to build capacity to integrate sustainability in a holistic way to the operation of civil society organisations will help them to have more impact in their work.</p> <p>NGOs, sport clubs and community groups impact their members behaviour (eg. sport clubs impact behaviour of young people) to take climate action in their daily lives.</p>	<p>Promoting better cooperation between the city organisation, NGOs and resident groups.</p> <p>NGOs and community groups can better communicate the impact of their work and attract also exterior financing.</p>



	example Carbon Neutral Basket Ball team Honka).				Inter-organisational collaboration and co-creation Shared understanding of challenges and opportunities
Supporting voluntary action of residents	City supporting residents' voluntary action. For example, Our Park concept, where resident groups or housing associations make an agreement with the city to take care of their local environment, community effort to stop invasive species, supporting carbage collection of resident groups and individuals by providing equipment and supporting planting events or flowers and trees with resident's and NGOs.	Urban Environment Sector	Residents Community and neighborhood groups, housing associations	Having agency creates hope and empowerment in the sense that it gives people the possibility to affect their own future. That can reduce the climate anxiety. The more hands-on the activity is, the more it usually gives a sense of having an impact. Residents can build a feeling of ownership and responsibility to actively take care of their local environment.	Sense of community and well-being benefits brought by the social interaction (eg. reducing loneliness). Working to protect the local nature helps to grow the connectedness to nature that correlates positively to environmentally friendly behaviour. Liveable and resilient way of life
Systemic initiatives, plans and projects					
New City of Espoo Master Plan 2060	Espoo Master Plan 2060 is a citywide general plan that directs the city's growth and the key questions in land use. The master plan directs transport, mobility and the placement of housing, services, workplaces, and recreational areas. At the moment, Espoo has several master plans that form an inconsistent whole. The	City Planning Unit (Urban Environment Sector)	Residents, NGOs, companies City sectors and units The planners gather all kinds of information through studies and surveys by hearing experts in	The new City of Espoo Master Plan covers the entire city, and its goals, agreed by City Board in 2023, are set for 2060. The goals emphasise sustainable city growth, climate smartness, improvement of transport connections, general pleasantness, and proximity to nature. Espoo	Sustainable and resilient urban environments Liveable and resilient way of life Sustainable, smooth, and accessible mobility choices



	<p>partial master plans will be compiled into a consistent and up-to-date full master plan. The preparation started in 2022 and are expected to last until 2027.</p> <p>Residents, NGOs, companies and other Espoo-based parties will be provided with opportunities to participate in the preparation of the master plan.</p> <p>Climate change will be tackled by supporting carbon-neutral energy solutions and protecting the city's carbon sinks and reservoirs.</p>		<p>various fields discussing matters with residents and stakeholders, such as business representatives and the operators in charge of the city's technical maintenance. The planners also cooperate with the various sectors of the city.</p>	<p>will be developed as climate-smart city of networks.</p> <p>Sufficient carbon sinks will be ensured by marking our most important sinks and reservoirs as green areas. Green transition towards low emission forms of transport is supported by connecting the city's central locations with efficient public transport. One goal is to enhance the city's internal, east-west public transport network. Bicycling opportunities will also be enhanced by developing the city's main bicycle route network.</p>	<p>Participation and democracy</p>
<p>Increasing the carbon handprint of Espoo community</p>	<p>Espoo acts as a test lab for learning how cities and regions can contribute to the development of the carbon handprint. While bringing local emissions down, Espoo's goal is to simultaneously increase the size of the urban community's carbon handprint. In other words, this means contributing to the reduction in global emissions with the help of innovations developed in Espoo. Businesses in Espoo will first pilot solutions locally</p>	<p>City of Espoo</p> <p>Climate Leadership Coalition (CLC)</p>	<p>Businesses, start-ups</p> <p>Research and innovation actors</p>	<p>To promote the carbon handprint Espoo can offer assets – for example buildings, infrastructure, land – for use as pilot facilities for new solutions. In addition, Espoo can accelerate demand for new products and services via public procurement and other services and help innovators analyse problems and develop solutions using open data. New concepts and solutions can then be</p>	<p>Green & digital transition of local economy</p> <p>Local job and value creation</p> <p>Innovative and scalable solutions</p> <p>Sustainable competitiveness</p>



	and then export the best solutions globally. This way, Espoo's impact can exceed its physical size			shared effectively via city and regional networks.	
Sustainable Future Districts	The Sustainable Future Districts project (2023-2026) creates development and innovation environments in city districts, where companies and research institutes can test and create climate-neutral urban solutions and develop sustainable scalable business models. The main development environments in project are Kera, Leppävaara, Espoon keskus, Kivenlahti, Keilaniemi, Finnoo and Viiskorpi.	Centre of Excellence for Sustainability (Mayor's Office) in collaboration with the Urban Environment Sector.	City sectors and units Companies, land-owners Research and innovation actors Residents	<p>Espoo aims to be carbon-neutral by 2030, and the Kera area has a big role to play in achieving this goal as a district where new solutions can first be developed and tested.</p> <p>In the project, solutions will be developed within four urban environment themes: clean energy, low carbon construction and circular economy, sustainable traffic and natural solutions. These themes are promoted through, for example, experiments, competitions and pilots to create new sustainable solutions and innovations in the city.</p>	<p>Innovative new services and products to support sustainable lifestyle of residents</p> <p>References and competitiveness for companies operating in the field of green transition</p> <p>Increased understanding and knowledge for the city organization of the possible and available solutions, e.g. for defining procurements.</p>
Energy service model for regions (ENPA)	The ENPA project (2023-2026) promotes collaboration between municipalities and private entities through the procurement of energy service models for city regions. Espoo aims to assess the suitability of energy service models for different types of city districts, the profitability of service	Centre of excellence for sustainable development, Mayor's Office City of Helsinki City of Vantaa Metropolia University of Applied Sciences	Private sector, NGO's, research institutes	<p>The assessment and implementation of energy service models aids in the achievement of climate goals related to energy.</p> <p>Collaboration between the public and private sector increases new innovation and business</p>	<p>Increased understanding and knowledge for Espoo city departments and other cities through dissemination activities</p> <p>New services to support residents' needs, and thus</p>



	models, and their strengths and weaknesses.			opportunities within the field of sustainable energy	supporting sustainable lifestyles.
BalticSeaH2 hydrogen valley	BalticSeaH2 project is partly EU funded project, which pioneers an innovative initiative, establishing a significant hydrogen valley spanning across the Baltic Sea region.	CLIC Innovation, Gas Grid Finland	The consortium includes 40 partners (incl. private companies) from nine Baltic Sea region countries: Finland, Estonia, Latvia, Lithuania, Poland, Germany, Denmark, Norway, and Sweden.	Focused on southern Finland and Estonia, BalticSeaH2 strives to build an integrated, interregional hydrogen economy. Demonstration and investment cases will showcase the diverse applications of hydrogen across multiple sectors, attracting a total investment of over 4 billion euros. The role Espoo is central as we need all the possible partners onboard to enable the necessary changes and allowing favourable investment opportunities and environment for new green hydrogen solutions and use cases.	Excellent opportunity for the city to learn and assess its own role in hydrogen development.
Skills and capacity building					
Eco-support network	The internal Eco-support network helps to develop the city functions, processes, services and mindsets to be more climate-friendly and sustainable. The network helps also to facilitate cross-administrative cooperation in the city organization. There is also an interior network of educators on sustainability	Centre of Excellence for Sustainable Development (Mayor's Office)	City departments Schools	Capacity and capability building within the city organization to better integrate climate action and sustainability in the city operations.	Holistic understanding of sustainability Improved capacities and capabilities to promote climate action Shared understanding of challenges and opportunities



	themes that promotes also climate work in teaching.				
Integrating climate and sustainability in trainings offered to city personnel and management	Capacity building of city personnel and managers by integrating sustainability and climate topics in trainings offered to different personnel groups: new personnel, unit and department managers, teachers etc.	HR Unit with the support of Centre of Excellence for Sustainable Development (Mayor's Office)	City personnel and managers	Capacity and capability building within the city organization to better integrate climate action and sustainability in the city operations.	Improved capacities and capabilities to promote climate action Shared understanding of challenges and opportunities
Citizen engagement network	The internal citizen engagement network is open to all city employees interested in shares best practices, challenges and experiences on issues related to citizen engagement, participation and inclusion of vulnerable groups. The network organises meetings and trainings and has a network of facilitators to support facilitating events.	Strategy and Development Unit (Mayor's Office)	City departments and units City personnel Citizens, including vulnerable groups	Climate action becomes inclusive by engaging a wide range of stakeholders, designing policies that are fair and accessible, and equitably distributing policy impacts. Internal capacity building and sharing of best practices in how to include citizens and different citizen groups is a key element of ensuring just transition.	Participation and democracy Sense of community Social sustainability Accessibility
Change in social behavior					
Education for sustainable development	Promoting sustainable mobility for children and young people through attitude education and encouraging cycling and sustainable mobility at kindergartens and schools. Learning about waste reduction, new recycling methods, circular economy and sustainable consumption	Growth and learning sector	Children and youth	The sustainability education aims at empowering children and youth with the knowledge, skills, values and attitudes needed to act as agents of change and make sustainable choices in their daily life. With the youth, these attitudes are carried to homes.	Improved capacities and capabilities to promote climate action Active youth Adoption of nature- and climate-friendly lifestyles



	as part of education at all levels. Improving sorting facilities at schools to enable learning by doing.			Democracy education is an integral part of Espoo's early childhood education, basic education, general upper secondary education and youth services, as it seeks to promote our values and foster a deeper understanding of democratic principles, participation, justice and civic responsibilities to enable just transition through the whole society.	
Climate friendly meals	Climate friendly meals and food wastage reduction in city's food services. "Nudging" used to make vegetarian food choices more appealing by e.g. placing vegetarian option first in line.	Food services Espoo Catering	Customers of food services Food producers	Food served at schools, daycare centres and other city facilities increasingly climate-friendly encouraging citizens to also make sustainable food choices in their daily lives.	Reduction of waste management costs Resource efficiency Adoption of climate-friendly lifestyles
Advice and guidance that supports sustainable energy and mobility choices and promote energy citizenship	Advice and guidance to residents promoting sustainable choices energy and mobility. An active resident in energy matters, i.e. an energy citizen, takes responsibility for their energy consumption and its impacts. New capacities are needed as building owners become electricity producers and charging points for vehicles	Centre of Excellence for Sustainable Development (Mayor's Office)	Citizens, housing associations City sectors and units in Urban Environment Sector	Citizens have gained new capacities as local energy producers. Housing associations are aware of benefits on installing EV charging infrastructure.	Improved capacities and capabilities to promote climate action Improved energy and resource efficiency Reduction in energy bills of households and industry



	move from filling stations to homes. Capacity building of housing associations on how to install electric car charging infrastructure and the national subsidies available.				Reduced energy poverty Improved energy security
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6.3 Module C-3 Financing of Action Portfolio

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

C-3.1: Summary of interventions with cost implication (to be unpacked in Investment Plan)					
Action/ intervention name	Responsible entity	Start/end date	Field of action	Impact	Total cost estimated 1000 €
E1: Espoo Clean Heat - replacing fossil fuels in district heating	Fortum	Started - 2030	Energy systems	Emissions 2030 compared to 2022 -319 kt	229 674
E2: Reducing emissions in electricity consumption, reducing oil heating and industrial fuels of housing, industry, and services	Citizens and housing associations Industry and service companies City of Espoo Energy companies Private businesses, citizens, housing associations	Started - 2030	Energy systems	Oil heating Emissions 2030 compared to 2022 -55 kt Reducing emissions from electricity consumption Emissions 2030 compared to 2022 (electricity consumption) -46 kt Emissions 2030 compared to 2022 (electric heating) -34 kt.	19 359



E3: Energy optimization and energy savings in city-owned buildings	City of Espoo Espoon Asumusten rental housing company	Started - 2030	Energy systems	No direct emission reductions. Contributes towards / enables actions E2 and E1.	12 513
E4: Enabling the increased electrification, network investments required to energy and mobility actions to be implemented	Caruna City of Espoo City-wide Electric grid Buildings, streets Charging infrastructure	Started - 2030	Energy systems	No direct emission reductions. Contributes towards / enables actions E1 and M3.	109 000
All Energy systems actions development, Cross Cutting Costs	City of Espoo, Fortum and Caruna	Started - 2030	Energy systems	No direct emission reductions. Contributes towards / enables actions E1-E4.	7 417
M1: Promoting walking and cycling	City of Espoo: Public works department Traffic planning department Centre of Excellence for Sustainable Development	Started - 2030	Mobility & transport	No direct emission reductions. Contributes towards / enables emission reductions in car traffic (M3) and shift to public transport (M2).	25 550



M2: Promoting the shift to and reducing emissions of public transport, eg. Western Metro, Espoo City Rail Link, Public Bus transport and mobility infrastructure investments towards district centres and good public transport links	Helsinki Region Transport (HSL) Länsimetro Oy City of Espoo	Started - 2030	Mobility & transport	Emissions 2030 compared to 2022 -5,12kt/year	2 062 936
M3: Reducing emissions of car traffic, increasing the use of renewables in transport)	City of Espoo Ministry of Transport and Communications Espoon Asunnot VTT Aalto University	Started - 2030	Mobility & transport	Emissions 2030 compared to 2022 -142kt	56 063
All Mobility and Transport actions development, Cross Cutting Costs	City of Espoo	Started - 2030	Mobility & transport	No direct emission reductions. Contributes towards / enables emission reductions in car traffic (M3) and shift to public transport (M2).	6 864
B1a: Steering construction to existing centres and good public transport links	City of Espoo	Started - 2030	Built environment	No direct emission reductions. Contributes towards / enables scope2 emission reductions in energy and transport as well as scope3 emissions of construction and services. Traffic	2 450



B1b : Developing Espoo's city districts as innovation hubs for low-carbon and smart solutions	City of Espoo	Started - 2030	Built environment	emissions are included in Mobility and Transport actions.	Included in cross-cutting costs
B2a: Promoting low-carbon construction	City of Espoo Espoon Asumot	Started - 2030	Built environment		379 992
B2b: Emission-free work sites	City of Espoo Espoon Asumot	Started - 2030	Built environment		Included in cross-cutting costs
All Built Environment Actions, Cross Cutting Costs	City of Espoo Espoon Asumot	Started - 2030	Built environment		3 336
W1: Reducing emissions from waste treatment	Helsinki Region Environmental Services (HSY)	Started - 2030	Waste and circular economy	Emissions 2030 compared to 2022 -14 kt	3 708
W2: Promoting circular solutions	City of Espoo Helsinki Region Environmental Services HSY	Started - 2030	Waste and circular economy	Small direct emission reductions on scope 1 and 2 emission. Contributes towards emission reductions in other sectors such as energy and transport. Greater effect on scope3 emission reductions. Espoo has not yet developed emission reduction scenarios for scope 3 emissions, so it is not yet possible to provide an estimated number of emission reductions.	Included in cross-cutting costs
All Waste and Circular Economy Actions	City of Espoo Helsinki Region Environmental Services HSY	Started - 2030	Waste and circular economy	Included in W1 and scope 3.	3 688



G1: Directing city growth to built-up areas and preserving carbon sinks	City of Espoo	Started - 2030	Green infrastructure & nature-based solutions	Directing city growth to built-up areas helps to preserve carbon sinks to offset the residual CO2 emissions in 2030. In addition, it contributes towards emission reductions in other emission sectors, particularly transport enabling efficient public transportation for citizens.	9 380
G2a: Nature-wise Espoo and nature conservation measures	City of Espoo	Started - 2030	Green infrastructure & nature-based solutions	Affects other emission sources, no direct emission reductions on scope 1 and 2 emissions.	5 124
G2b: Fostering biodiversity and nature-based solutions in urban development	City of Espoo	Started - 2030	Green infrastructure & nature-based solutions		15 000

7 Outlook and next steps

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

Plans for next CCC and Action Plan iteration – textual elements

Espoo's Climate City Contract has focused on building a strong mandate for climate-neutrality by 2030 with the city and stakeholders, identifying and understanding the interconnected systems that need to be activated to close the gap to net zero, and in co-creating a portfolio of direct and enabling actions with significant impact on city's climate emissions.

According to emission reduction scenarios, action portfolios and impact pathways developed during the CCC process, Espoo has the potential to reduced emissions to reach the climate-neutrality goal by 2030, but the work is far from over. Particular attention needs to be paid to emissions related to transport and mobility that will form the largest share of Espoo's future GHG emissions due to rapid decarbonisation of energy production. Some actions may still lack political will or public support, or be dependent on national regulation or mobilizing stakeholders, requiring continuous dialogue with local decision-makers, national authorities, and with citizens and stakeholders.

Transition to net zero and developing the next CCC are therefore seen as iterative processes. Next steps identified during the development of the Action Plan include:

- Partnerships: Co-developing a joint working method with partners that have signed Espoo's Climate City Commitment with regular high and expert-level meetings and opportunities for co-creation and joint learning, and inviting new partners to join the work.
- Dialogue with decision-makers and city departments: facilitating the ongoing dialogue between political decision-makers and city departments on climate pathways, actions and co-benefit to increase acceptability of climate actions.
- Just transition: Workshops, events, webinars, surveys, meetings, and citizen panels provide platforms for dialogue and collaboration with different stakeholders, communities, and citizens. Digital engagement platforms will be used to gather input from those who might not attend in-person events Concerns related to social and environmental justice and for example energy poverty will be addressed to enhance acceptability of the planned climate actions and ensure that effects on different communities, including marginalized groups are taken into consideration. Espoo's population growth comes mainly from immigration and the share of citizens with immigrant background is estimated to continue to rise rapidly in the next years. Therefore, ensuring that these groups are included as actors of change for climate action is one of issues to be addressed.
- Climate budget and investments: CCC Investment Plan forms the basis of Espoo's first climate budget to be included in the city's Annual Budget 2024 and 10-year investment plan. Climate budgeting makes the goal of climate neutrality more concrete and transparent for citizens, decision-makers and the whole Espoo community and will be developed in future budget rounds to gain more comprehensive and granulated view on climate investments and their impact. In addition, different funding sources, public-private partnerships and private investment will be continuing to be explored to contribute towards the 2030 goal.
- Climate-neutral Espoo Roadmap and climate action portfolio: ambitious climate action portfolio identified in the CCC will be implemented solve climate challenges related to local energy, transport, circular economy, built environment and nature-based solutions step by step with Espoo innovation community and stakeholders. Climate-neutral Espoo Roadmap is prepared and climate measures updated simultaneously with CCC process to be approved by the City Board in 2023 and updated once in a 4-year council term.
- Sustainable Urban Mobility Plan (SUMP) and Sustainable Urban Logistics Plan (SULP) will be prepared in 2024 to futher address the emissions related transport, mobility and logistics



expected to form the largest share of Espoo's future GHG emissions. SUMP will form a strategic and integrated approach to dealing with the complexity of urban transport and a key instrument to fostering low-carbon, accessible, safe, and affordable mobility.

- Scope 3 emissions: Espoo has already included actions related to reducing scope 3 emissions, for example those related to building, and will continue towards the goal of 1.5 degree lifestyle. The calculation methods for scope 3 consumption-based emissions will continue to be developed with research organisations, experts and other Finnish cities to allow for more accurate data and inclusion of scope 3 emissions to future emission inventories and scenarios.
- National and international collaboration: Espoo will continue to work in close collaboration with NetZeroCities, Finnish national authorities and Mission Cities, other European cities and the Commission to develop and share learnings to support the 100 Climate-neutral Cities Mission goals.
- Monitoring and learning: yearly monitoring and review with city organisation and stakeholders to follow up the progress our climate goals and actions and provide opportunities for joint learning and if necessary, identification of new actions and pathways to accelerate the effort.

Espoo's Climate City Commitment will be updated every two years in an inclusive process with city departments, stakeholders, and citizens following the support and guidelines provided by NetZeroCities.

8 Annexes

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

ANNEX 1 Kulma_consumption based emissions_Espoo_13062023_ENG - for CCC

ANNEX 2 City of Espoo Future Emission Reduction Scenarios FINNISH

Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments of City of Espoo



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Disclaimer

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Appendix: Individual Signatory Commitments



1 Introduction

As one of the leading European smart and sustainable cities, the City of Espoo is strongly committed to climate neutrality by 2030. In 2019, we prepared Sustainable Energy and Climate Action Plan (SECAP) as a key instrument for its implementation. In 2021, our ambitious climate target was further emphasized when selected by the Espoo City Council as one of the seven key strategic goals of our city strategy, the Espoo Story.

Our aim for the 100 Smart and Climate-Neutral Cities Mission is ecosystem-driven co-creation. Espoo is looking for the most impactful ways to cut emissions in cooperation with universities, research institutes, businesses, national and regional authorities, and citizens. As the largest innovation ecosystem in Northern Europe, Espoo is already an experimentation and innovation hub where smart, digital, and sustainable solutions of the future are being developed. Together with our partners we have created a strong overall vision and commitment to systemic change and are finding business-driven climate solutions that will create a positive carbon handprint and promote green growth both locally and globally.

In the past, Espoo has ranked number one in two sustainability benchmark studies of 145 European cities conducted by Tilburg University in 2016 and 2017. Our goal is to keep the growth sustainable also in the future. As the winner of the Intelligent Community of the Year award in 2018 and the Energy Globe World Award in 2019 and as a finalist in the European Capital of Innovation Awards in 2019, 2020 and 2022, we have been recognized as a global forerunner in smart city development and sustainability. We are actively sharing our knowledge and learning together with the European community through city networks such as Eurocities, ICLEI and URBACT and initiatives such as the Covenant of Mayors, Circular Cities Declaration and Local Green Deal.

Espoo and its partners are finding the most impactful ways to cut CO₂ emissions at a rapid pace. The climate solutions in Espoo focus on emissions from energy, transport, land use, and construction. Highlights of our journey include carbon-neutral district heating for 250,000 end-users that will be produced during the 2020s and coal completely abandoned already by 2025. In addition, major investments have been made to new metro and tram connections to keep the city growth sustainable. An electric charging infrastructure is well under way to help to solve the challenge of cutting down private car emissions in a network city with five urban centres with relatively long distances. All new buses and vehicles in the city fleet are low emission models. City bike system brings co-benefits of cleaner air, health, and well-being. However, new solutions to bring down emissions particularly from transport and logistics, are still needed to reach the city-wide goal of climate-neutrality.

We are committed to building a city that is both sustainable and inclusive. Espoo hosts strategic cross-sectoral programmes that allow dialogue and co-creation between political leaders, city officials, research and innovation actors, citizen forums and NGOs. We are co-creating human-centric solutions that are ecologically, economically and socially sustainable and benefit diverse groups of citizens ensuring that no one is left behind. A thousand staff members, citizens and partners were engaged in reviewing Espoo's progress towards a sustainable future in our UN Agenda 2030 Voluntary Local Review in 2020. We are strongly committed to delivering the Cities Mission in an equally inclusive and participatory manner bringing the policy close to people.

Participating in the Mission is a way for us to accelerate local collaboration and action towards rapid decarbonization as well as to strengthen our role as an interesting piloting and innovation hub for low-carbon solutions in Europe. We are eager to learn and share our successes with others, together building the path for climate neutrality. As one of the Mission cities, we will focus on experimentation, co-creation and tangible results – together with the entire community.

In this commitment we outline and declare the fruitful collaboration with our partners towards climate-neutrality. City of Espoo has a unique way to develop together with different stakeholders: companies, civil society, and citizens. We see this Commitment and the Mission as an important tool to further tighten and strengthen this collaboration.

2 Goal: Climate neutrality by 2030

The goal of the City of Espoo is to become climate neutral by 2030. To this end, we commit to delivering bold climate action that will enable us to achieve the indicated goal on time. We commit to do this in collaboration with the whole community, promoting innovation and sustainable growth, and in a fair and just way not leaving anyone behind.

Espoo City Council set the target of becoming a climate-neutral city by year 2030 in 2017. This commitment was further emphasized in 2021 in the Espoo Story, the city's strategy, that outlines climate-neutrality by 2030 as one seven key targets for the whole city organisation for the council term 2021-2025. As Finland's second largest city, Espoo is one of the key actors contributing to regional and national targets of climate neutral Helsinki-Uusimaa region by 2030 and climate neutral Finland by 2035. Climate actions have the potential to bring about multiple co-benefits such as improvements in public health, less air and noise pollution, increased energy security and reduced cost of energy, green and digital transition of local economy, job and value creation, and preservation of sufficient ecosystem services, biodiversity, and green areas.

Espoo's climate neutrality target is defined as 80 % emission reduction compared to the base year 1990 level. The remaining 20 % share can be absorbed in carbon sinks or compensated by other means. Carbon sink is a term used to refer to growing carbon stocks, such as growing forests. Compensation refers to emission reduction units procured from outside the city organisation's own activities to compensate for the remaining greenhouse gas emissions.

Espoo intends to address all Green House Gases (GHGs) and sectors and sources of emissions to reach climate neutrality by 2030 as defined by the Cities Mission. Our target includes scope 1 and 2 emissions as well as scope 3 emissions due to the disposal and treatment of waste and wastewater generated within the city boundary.

Espoo's climate ambition is supported by several partners and stakeholders. Espoo recognizes its role as a city in not only supporting its own climate actions, but partners' actions as well. All city units are committed to climate neutrality by 2030.

Espoo is proud to welcome committed climate partners from different stakeholder groups: business, education and research. Altogether x partners have signed the climate-neutrality commitment by 15 September, 2023 and y partners have attached their climate commitment appendix already and the rest are to hand in their appendices by 15 March, 2024. Espoo is working closely with stakeholders towards the year 2030 and has a continuous process to welcome new climate partners.



In fall 2022 Espoo conducted a scenario study to learn if current decided climate actions are enough to reach carbon neutrality by year 2030. This study showed that additional activities are needed especially in traffic and mobility sector and in lesser extent, also in the energy sector. In addition, Espoo has conducted two preliminary studies (2020, 2023) on how to count consumption-based scope 3 greenhouse gas emissions. While these are not counted in the climate-neutrality target, the city is committed working towards reducing the emissions in sectors such as construction and public food services, and procurement of other goods and services.

3 Key priorities and strategic interventions

Espoo's strategic interventions focus on delivering systemic changes together with the whole community in five key areas. Actions in these sectors are estimated to have the largest potential for decarbonization as well as provide the important enabling measures needed for truly systemic change. These key priorities have been identified with stakeholders, partners, and citizens (see section 4).

Energy systems

The goal is an intelligently controlled energy system, which enables households and companies situated in Espoo to use reasonably priced and sustainable energy.

- Delivering carbon-neutral district heating by 2030 (Espoo Clean Heat).
- Energy optimization, efficiency and savings in city's own building stock, housing, industry, and services.
- Developing smarter, more flexible electric grids to provide the basis for achieving climate-neutrality in both district heating and transportation.

Mobility and transport

The aim is for all residents to be able to make smooth and low-emission everyday journeys supported by well-functioning, low-carbon urban logistics

- Increasing the efficiency of the transport system in a network city with five urban centres connected by rails.
- Promoting the shift to sustainable modes of transport (walking, cycling, public transport).
- Speeding up the uptake of e-mobility, electrification of transport and the shift from fossil fuels to fossil-free fuels.

Built Environment

Espoo's aim is to keep its fast population growth sustainable by directing new construction mainly to already built areas and along good public transport connections and to develop new low-carbon and digital solutions in close co-operation with diverse partners.

- Developing the Espoo's diverse city districts in close co-operation with businesses and research and development partners to promote the introduction of smart and low-emission urban solution.
- Land use planning, i.e. zoning and permitting act as enablers for sustainable mobility, zero-emission energy solutions and low-carbon construction.

- Cutting down emissions and reducing environmental impacts of construction throughout its life cycle in city's own construction and construction management. Implementing the national green deal agreement towards emission-free construction sites.

Waste and circular economy

The goal is for Espoo to be a climate-neutral city that adheres to the principles of the circular economy in its own actions, is home to the best circular economy experts, businesses and research in the country and enables its residents to make sustainable choices in their everyday lives.

- Promoting circular economy in construction and demolition, efficient use of space, reuse of materials, bio circular economy, sustainable procurement, and circular and sharing economy services offered to residents.
- Developing city districts of Kera and Kiviruukki as platforms for circular solutions that provide research, development, and innovation (RDI) and business opportunities for circular economy actors.

Green infrastructure and nature-based solutions

Espoo is an exceptionally green city, where forests cover nearly 60 % of the city's surface area. The goal is to preserve sufficient level of carbon sinks to offset the residual CO₂ emissions in 2030. In addition, Espoo's goal is to be a pioneer in reconciling the needs of a growing city and protection of biodiversity.

- Directing construction to already built-up areas to conserve carbon sinks, biodiversity and natural values.
- Finding ways for Espoo's urban development to foster, revitalise and increase biodiversity to achieve the goal of no net loss by 2035.

In addition, Espoo will develop and implement activities such as citizen engagement, capacity building, and marketing and communications to support the systemic and behavioral change needed in the community towards the goal of climate-neutral city by 2030.

Significant co-benefits of the collaboration with different stakeholders are increasing vitality and well-being in general: co-creation and collaboration create shared understanding and vision. Espoo becomes more attractive and its citizens and other stakeholders feel sense on belonging. Pilot areas and test beds are agoras of fruitful collaboration with concrete results towards climate-neutral future. Forerunner atmosphere continues to entice new companies, capabilities connecting to high-quality learning, research and development opportunities in daycares, schools, universities and research institutes.

4 Principles and process

Ambition and mandate

The Espoo Story is the city's strategy, a visionary narrative created together with city employees, citizens, communities, and companies. According to the strategy, Espoo wants to be the most sustainable city in Europe, now and in the future. Climate-neutral Espoo by 2030 is one of the seven key strategic targets for 2021-25 guiding the operations of all city sectors and departments.

Espoo has developed an approach to work towards sustainable and smart city in a coordinated manner since 2013, when the city launched its first cross-sectoral Sustainable Espoo Programme to support the first Espoo Story. It is a strategic cross-sectoral programme owned by the mayor and led by a high-level steering group to lead long-term, goal-oriented systemic development towards a climate-neutral city. Since then, the city has carried out a high number of projects and activities all contributing to the systemic transformation. With this strategic and organisational backbone, we see the implementation of our Climate City Contract as a way to further accelerate local collaboration and action towards rapid decarbonization.

The transformation is supported by a team of 25+ experts working in the Mayor's Office Centre of Excellence for Sustainable Development. The team collaborates with the different departments of city organisation as well as the innovation community, private sector, third sector and citizens. In June 2023, the centre has joined forces with experts working on other cross-cutting, strategic issues such as digitalization, immigration, international relations, co-creation, citizen engagement, research, and data management to form a new Strategy and Development Unit providing even more coherent approach to address the systemic challenges of a growing city.

In 2023, Espoo is updating its Climate-neutral Espoo 2030 roadmap, prepared simultaneously with Climate City Contract, for the city council's approval. The documents bring together all existing policies, actions and programmes and identify actions to address the gap between those and the goal of climate-neutrality.

Systemic innovation, collaboration and trust

With over 400 R&D units, a top-level business, design and tech university, and a host of leading companies clustered in a small area, Espoo is one of the leading innovation capitals of Europe. The city, together with Aalto University and technological research centre VTT, forms a core that brings together all players – start-ups, students, top companies, researchers, and ordinary citizens – to create innovation for a better life.

We believe that tackling the climate crisis require truly radical creativity – a form of working where people from all walks of life collaborate to find new solutions to the large, systemic problems such as climate change. Collaboration and trust between the decision-makers, thinkers and doers from all industries and disciplines is our strength and the basis on which we are building our climate city contract.

We have already gained positive experiences with joint sustainability and climate commitments and strong partnerships supporting climate neutrality. In our flagship decarbonization project, Espoo Clean Heat, Fortum and the City of Espoo committed to transformation that will result in carbon-neutral district heating by 2030 in the region and transition to local self-sufficient heating on a large scale. In Kera district, sustainability partnership is consolidated with a commitment in the land use agreements, and in the Finnoo area, the constructors are committed to pioneering clean energy solutions. We will take learnings from these past commitments to provide support for experimentation and bring players together across organizational boundaries to open our urban environments as development platforms for new sustainable solutions.

Open dialogue and co-creation

Espoo as a forerunner has been developing innovative ways for co-creation, open dialogue and multi-actor approach widely with stakeholders for sustainable development. Focus areas include smart energy, smart mobility, circular economy, city design and built environment. As a city, we commit to enabling co-operation, bringing together different actors and building project portfolios aimed at solving systemic challenges in the city piece by piece.



In this spirit, we have sent an open invitation to our partners to jointly draft Espoo's Climate City Contract and join the effort with their own commitments towards climate-neutrality. The work began in March 2023 with mayor's invitation. 'Let's create a climate-neutral Espoo together' high-level event drew together 70 representatives of the city and its partners. After that, the work has continued in one-to-one meetings and joint workshop. With our stakeholders we are co-creating a working method to support climate work collaboration with companies and citizens until 2030 and beyond.

In addition to dialogue on the local level, we work in partnership with other Finnish Mission Cities, the national government, communities in greater Helsinki capital and metropolitan area, and Helsinki Uusimaa Regional Council. Finnish Mission cities form a close-knit community supported each other and relevant ministries. The cities share and co-learn and work closely with national government to make sure the voice and needs of cities are heard when developing national regulation and support. The cities together with their local partners are key actors needed to deliver the ambitious Finnish national climate neutrality target of 2035.

From consultation to partnership is the slogan that guides Espoo's approach and model to citizen participation. It describes the shift towards a more inclusive and participatory governance. In 2022, a new resident participation group was introduced to strengthen the direct links between residents and Sustainable Espoo Programme. Partner group that consisted of residents from diverse backgrounds, including marginalized groups, met in facilitated co-design workshops focusing on different aspects of the city's sustainability work, including the preparation of Climate City Contract.

We are also developing ways to assess and monitor the climate actions and their impact, and to improve the quality of climate data continuously.

Carbon footprint, carbon handprint and climate heartprint

In Espoo, we understand climate work as part of a bigger picture than emission reduction per se. We believe that climate work can have significant effect on how our city develops in the future and how we increase health and wellbeing, attract investments and talent, create new business opportunities and jobs, and help to develop attractive and safe neighbourhoods.

The partners we have invited to join our commitment are companies, universities and research actors that are located in Espoo and/or have a significant effect on our city's carbon footprint, carbon handprint or what we call the climate heartprint.

First and foremost is the carbon footprint. We need to continue the rapid decarbonization and cut our carbon footprint to reach the goal of climate-neutrality by 2030.

However, equally important goal for us is to increase the size of the community's carbon handprint, or in other words, contribute to the reduction in global emissions with the help of innovations developed in Espoo. Local actors such as universities, research organizations and businesses create innovations that are both sustainable and commercially successful, test and pilot them in Espoo, and then export the best solutions globally. This way, our positive climate impact can be much greater than our city's size.

In addition to footprint and handprint, we need a lot of other changes to happen in our community - changes in skills, capabilities, mindsets, and actions. To describe these, we have created a third concept called climate heartprint, which describes efforts in education, guidance, behavioural change, support and engagement, the effect of which may be difficult to count, but without our efforts will likely fall short.

We are committed to inclusive and just transition that leaves no one behind. We have engaged citizens in our climate action and the development of the city and its districts - starting with the city strategy. Climate work is supported also by city's commitment to be a forerunner in localizing the UN Agenda2030 Sustainable Development Goals (SDGs), with the key theme of "Leave no-one behind".

Monitoring and joint learning

We commit to working in close co-operation with the Espoo community in delivering our Climate City Contract. We will invite the actors to regular joint dialogues, provide opportunities for joint learning and work together with our partners to further accelerate our joint impact.

Within the city organisation, we will monitor our progress in Sustainable Espoo Programme's steering group, that is formed half of political leaders representing all eight different political groups of the city council, and half sectoral leaders from the different departments of city organisation.

It will provide a platform for ongoing dialogue between political decision-makers and city department managers. The group is independent from city's normal hierarchical structure allowing for horizontal, silos breaking forms of governance needed for systemic change.

In addition, the mayor chairs an internal climate steering group that meets regularly to follow the work and share information between city departments.

We will have yearly monitoring and review process to see the progress our climate goals and actions. The Climate City Commitment will be updated every two years. The City Council will update the Climate-Neutral Espoo 2030 roadmap at least once in a city council term (4 years).

5 Signatories

Name of the institution	Sector/Area	Legal form	Name of the responsible person	Position of the responsible person
City of Espoo	municipality	municipality	Jukka Mäkelä	Mayor
Aalto University	university	foundation	Ossi Naukkarinen	Vice President
* Academic Engineers and Architects in Finland TEK	trade union	Non profit	Juhani Nokela	Director, Public Affairs
Aimo Park Finland Oy	parking services	Limited company	Juha Sirelius	Managing director
*AINS Group (A-Insinöörit)	consulting, built environment	Limited company	Kari Kauniskangas	CEO
*Betolar	construction	Public limited company	Riku Kytömäki	President and CEO
*Caruna	energy	Limited company	Jyrki Tammivuori	CEO
Espoon Asunnot	public housing	Limited company	Jaakko Kammonen	CEO
*Finnpark	parking services	Limited company	Joni Mikkola	SVP, Helsinki Metropolitan area
*Fortum	energy	Public limited company	Markus Rauramo	CEO
Helsinki Region Environmental Services authority HSY	environmental service authority	Joint municipal authority	Tommi Fred	CEO
HSL Helsinki Region Transport	public transportation authority	Joint municipal authority	Mika Nykänen	CEO
Lassila & Tikanoja	environmental services	Public limited company	Eero Hautaniemi	President and CEO
*Laurea University of Applied Sciences	education, R&D	Limited company	Jouni Koski	President and CEO
Metropolia University of Applied Sciences	education, R&D	Limited company	Riitta Konkola	President and CEO



2030 Climate-Neutrality
Commitments



*NCC Building Finland, * NCC Property development Finland *NCC Industry Oy	construction	Limited company, Limited company, Limited company	Kati Tauriainen, Petri Bergström, Pertti Peltomaa	Head of NCC Building Finland, Head of NCC Property development Finland Head of department, stone materials Finland, NCC Industry Oy
Ramboll Finland Oy	consulting, built environment	Limited company	Maija Jokela	Managing director
*Ramirent Finland Oy	construction	Limited company	Mikael Kämpe	CEO
Siemens Osakeyhtiö	Electrical and electronic products and services	Limited company	Harald Schnur	Head of Smart Infrastructure, Finland and Baltic countries
Sitowise Group Oyj	consulting, built environment	Public limited company	Heikki Haasmaa	CEO
*SRV Group	construction	Public limited company	Saku Sipola	President and CEO
*VTT Technical Research Centre of Finland Ltd	research	Limited company	Antti Vasara	CEO
YIT corporation	construction	Public limited company	Heikki Vuorenmaa	President and CEO

* Individual Signatory Commitments included in this Climate city contract

List of signatories, contract with signatures and individual signatory commitments to be updated first in October 2023, and for individual Signatory commitments final deadline has been set to March, 2024.

Climate City Contract

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Appendix: Individual Signatory Commitments

Please remove the texts with yellow highlight colour.

[Specific agreements that articulate the details of the climate action(s) between the municipality and other stakeholders (individual or groups) can be added to the Commitments document appendix.]

In this document city of Espoo's climate work partner describes their work and commitments that contribute to the goal of climate-neutral Espoo by 2030. This document will be attached to Espoo's Climate City Contract. This document may be updated and developed when working towards target year 2030. An update will be submitted to European Commission every two years for assessment.

TEK is the largest organisation for academic engineers and architects in Finland, with a professional community of about 80,000 members. We are the labour union for graduate engineers, architects and other university degrees in the field of technology.

We are an organisation of professionals that promotes the science and technology industry in Finland and the people who work in those industries. Through our work we help graduate professionals to reach their highest potential within their chosen field. We work actively in promoting the advancement of education and ensuring that professionals in Finland are equipped with the best skills and competencies on an international scale. We at TEK promote sustainable technology for the benefit of people, the environment and society.



Name of the organization:

Tekniikan akateemiset TEK (ie. Academic Engineers and Architects in Finland)

Number of employees in total and in Espoo:

About 70 persons mostly located in Helsinki, but two (2) is located in Espoo

Main business area / line of activity:

Non-governmental organisation (Labour and professional union)

Company website:

<http://www.tek.fi>



Contact person in climate collaboration (name and position):

Jussi-Pekka Teini, Advisor of Engineering Sustainability

Operations related to climate action:

We support and promote the capabilities in climate issues of our members. In this work we work closely with universities and other organisations. For us, technology can be a big part of solutions for climate crisis and this message we tell for those making decision. In this work we also lobby for more r&d-resources for climate technologies.

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action:

We have good discussions with Espoo how they help Aalto University to be one of top research universities in the world. Also STEM-education for children is important for us and in this work for example our Young Scientists competitions finals has been arranged in Espoo for many years.

We hope to deepen our relations with Espoo in all these issues and especially immigration of climate specialist since we need more international talent in field of technology in Finland. We also hope that Espoo can be test bed for different kind of climate solutions in the future.

Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO ₂ reductions in Espoo)					
Carbon handprint (new innovations, research, products, and services that contribute to CO ₂ reductions elsewhere)					



<p>Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)</p>	<p>We work closely with universities to strenghtend their education about climate issues for all engineers.</p> <p>Many of our members live in Espoo, so we also bring understandin g of climate issues and how their work can affect for making Espoo climate-neutral city.</p>	<p>We work closely with universities to strenghtend their education about climate issues for all engineers.</p> <p>Many of our members live in Espoo, so we also bring understandin g of climate issues and how their work can affect for making Espoo climate-neutral city.</p>	<p>We work closely with universities to strenghtend their education about climate issues for all engineers.</p> <p>Many of our members live in Espoo, so we also bring understandin g of climate issues and how their work can affect for making Espoo climate-neutral city.</p>	<p>We work closely with universities to strenghtend their education about climate issues for all engineers.</p> <p>Many of our members live in Espoo, so we also bring understandin g of climate issues and how their work can affect for making Espoo climate-neutral city.</p>	<p>We work closely with universities to strenghtend their education about climate issues for all engineers.</p> <p>Many of our members live in Espoo, so we also bring understandin g of climate issues and how their work can affect for making Espoo climate-neutral city.</p>
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Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
<p>We have been carbon neutral organization from year 2022. We try constantly reduce our carbon footprint still so we have minimal need for compensation.</p>		



At the moment we cannot give exact numbers for these reductions and how much that would cost.		

Climate City Contract

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Appendix: Individual Signatory Commitments

AINS Group is a Finnish construction engineering, architecture, and consulting company. Our headcount is currently almost 1400.

We are Finland's leading construction management company, a high-quality architectural and principal designer, one of Finland's largest structural engineering companies, versatile infrastructure designer, and specialist in rock engineering and underground construction. We offer a wide range of expert services in renovation engineering, building physics and healthy buildings, as well as in technical engineering, industrial and environmental engineering.

Our most important environmental impact is through our work in every expert role. We help developers, builders, estate owners and housing companies succeed in their projects, which includes minimising the negative environmental impacts of our client projects. We call it our environmental handprint. We have set a systematic way of measuring and growing our environmental handprint in every project and on group level.



Name of the organization:

AINS Group (A-Insinöörit Oy)

Number of employees in total and in Espoo:

343

Main business area / line of activity:

Design, management, and consultancy for sustainable built environment; structural engineering, HVAC-engineering, industrial and process engineering, infrastructural engineering, architecture, construction management and other expert services.

Company website:

<https://www.ains.fi/en/>



Contact person in climate collaboration (name and position):

Liisa Jäätvuori

D.Sc., Executive Vice President, Corporate Development and Sustainability, AINS Group

Operations related to climate action:

Expert services for sustainable built environment, such as low carbon construction management, low carbon planning, design and design management.

Climate impact assessment and management for city zoning, project development, building lifecycle, and infrastructure lifecycle.

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action:

Consulting in several building and infrastructure construction projects in Espoo. We serve as experts of sustainable built environment in every role, as structural engineers, technical engineers, civil engineers, construction managers, and architects.

Expectations of increased collaboration, especially regarding climate impact assessment and management for city zoning, project development, building lifecycle, and infrastructure lifecycle.

Key strategic priorities

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO2 reductions in Espoo)				We have committed to setting a science-based target for climate impact reduction with the Science Based Targets initiative.	



<p>Carbon handprint (new innovations, research, products, and services that contribute to CO2 reductions elsewhere)</p>			<p>We are dedicated to serving as experts of sustainable built environment in every role; as structural engineers, technical engineers, civil engineers, construction managers, architects, and so on.</p> <p>We support built environment project in Espoo in achieving a lower climate impact through expert services, such as:</p> <ul style="list-style-type: none"> • climate impact assessment and management for city zoning, project development, building lifecycle, and infrastructure lifecycle • Circular economy in construction, incl. circular design and project specific product compliance • Responsible demolition planning • Urban biodiversity • life cycle properties: durability, flexibility, reusability • Energy efficiency, renewable energy and circular energy solutions for built environment • sustainable construction investment calculation • Environmental certifications • Climate adaptability planning and design 	
<p>Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)</p>			<p>As the experts of built environment, we acknowledge our environmental impact in every role. We have set environmental handprint at the core of our way of working and made it company-level strategic measure.</p> <p>We train staff to identify how climate and other environmental impacts can be positively impacted in their particular role, and encourage them to share the knowledge with clients and colleagues.</p> <p>We initiate and actively participate industry-level research and development projects that aim to solve the pressing issues of sustainable construction.</p> <p>We are prepared to offer training for Espoo's construction community in the same topics we offer expert services and develop the Finnish construction industry, for example, climate impact assessment and management process for city zoning.</p>	

Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
<p>AINS Group's main climate actions that contribute to the goal of climate-neutral Espoo by 2030, are related to services within sustainable built environment, as described above.</p>		
<p>Furthermore, we have a role as users of built environment and as commuter in Espoo and elsewhere. To address that impact, we have committed to setting a science-based target for climate impact reduction with the Science Based Targets initiative. The targets and related actions will be available in 2024.</p>		

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Appendix: Individual Signatory Commitments

In this document city of Espoo's climate work partner describes their work and commitments that contribute to the goal of climate-neutral Espoo by 2030. This document will be attached to Espoo's Climate City Contract. This document may be updated and developed when working towards target year 2030. An update will be submitted to European Commission every two years for assessment.

Betolar Plc is a Finnish materials technology company that offers the production of sustainable and low-carbon concrete with the Geoprime solution. The solution converts industrial side streams into a cement substitute.

Betolar's artificial intelligence innovation can significantly reduce CO2 emissions compared to traditional cement-based concrete production by optimizing existing manufacturing processes, supporting solution development with advanced analytics, and creating global markets for side streams. Betolar's mission is to help reduce CO2 emissions and the use of virgin resources.

Betolar was founded in 2016 and is domiciled in Kannonkoski, Finland. Betolar is listed on the Nasdaq First North Growth Market. Read more: www.betolar.com

BETOLAR

Name of the organization: Betolar

Number of employees in total and in Espoo: 64 in total, 32 in Espoo (per 30.6.2023)

Main business area / line of activity: Building material technology

Company website: <https://www.betolar.com>

Contact person in climate collaboration (name and position): Melina Pinomaa, ESG Manager

Operations related to climate action: Betolar's entire business model is around circular economy

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action:

- **Existing collaboration:** None
- **Expectations for future collaboration:** Given the nature of the construction sector, achieving scalable transformation needs a shift across the entire value chain. This is why Betolar's expectations for future collaboration lies in tangible commitments and initiatives. The City of Espoo plays a crucial role in procuring concrete/building materials and setting the procurement criteria. At the same time, at city of Helsinki, [there has been discussion](#) that the current procurement criteria is difficult for low-carbon alternatives. Espoo could showcase its



commitment to climate neutrality by accelerating the incentive to prioritize low-carbon materials in procurement, and initiating pilots/ a sandbox environment, where new innovations could be tested and taken into use. This could be eg a park or railway with pavement, parking area or other.

Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO2 reductions in Espoo)			X	X	
Carbon handprint (new innovations, research, products, and services that contribute to CO2 reductions elsewhere)			X	X	
Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)			X	X	

Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.



Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
<p>Calculating annually Betolar's CO2 emissions from Scope 1,2,3. Calculation will be based on GHG Protocol.</p>	N/A	N/A
<p>Supporting sustainable practices at Betolar's Espoo premises and lab. Betolar is ISO (9001; 14001; 45001) certified and committed to the continuous development, including our practices in our laboratory.</p>	N/A	N/A
<p>Building capabilities to calculate product-based Life-cycle Assessment (LCA). This will help Betolar's clients and the end-users with assessing the impact, not just CO2 emissions but also regarding other impact categories (natural resources, etc)</p>		

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

Appendix: Individual Signatory Commitments

In this document city of Espoo's climate work partner describes their work and commitments that contribute to the goal of climate-neutral Espoo by 2030. This document will be attached to Espoo's Climate City Contract. This document may be updated and developed when working towards target year 2030. An update will be submitted to European Commission every two years for assessment.

Caruna takes care of electricity distribution for approximately 726,000 customers in Finland, including the Espoo area. Caruna takes care of electricity distribution and maintain, overhaul and build a weatherproof electricity network.

Caruna monitors the operation of the network around the clock to ensure customers with safe and functional electricity distribution, hassle-free customer service, and reasonable prices.

A weatherproof, smart electricity network also creates the basis for an energy system of the future, in which digital services increase, transport is electrified, and consumers become energy producers.

Name of the organization:

Caruna

*Caruna includes two network companies: Caruna Oy, which operates mainly in rural areas, and Caruna Espoo Oy, which operates in urban areas.



Number of employees in total and in Espoo:

Employees: 259 (in 31 Dec 2022)

Main business area / line of activity:

Electricity Distribution

Company website:

www.caruna.fi

Contact person in climate collaboration (name and position):



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



Joel Seppälä, Regional Manager in Espoo

Operations related to climate action:

Energy infrastructure: Electricity distribution

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action:

The electricity distribution operator in Espoo, today "Caruna Espoo Oy", has a long tradition of developing the energy infrastructure together with City of Espoo to provide sustainable growth in Espoo area. As a result of successful collaboration, the energy infrastructure is strong and reliable. Therefore, Espoo area is today able to take advantage of green transition and to give the world a perfect example of decisive climate actions.

In order to complete the decided climate actions and to provide sustainable growth in the future, Caruna expects intensive co-operation with City of Espoo and other relevant infrastructure providers to gather deep understanding of developing the infrastructure as a part of developing city for future citizens. Caruna, Fortum and City of Espoo have created a joint program named "Espoo Clean Heat" which aims to carbon neutral heat production in 2029.

The concrete actions in collaboration relate to improve city development to reserve the space required by the infrastructure to efficiently serve needs of the citizens. Efficient space management improve the investment efficiency which in the end reduce the cost burden to the end customers – that is, the present and future citizens. Improving the processes of city development also increase the attractiveness of Espoo and Finland as investment environment in terms of reliable and smooth processes.



Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO ₂ reductions in Espoo)	Caruna provides infrastructure to reduce CO ₂ -emissions of energy production and energy use in Espoo.	Caruna provides the electricity infrastructure for green mobility.		Caruna is crucial infrastructure provider for sustainable built environment in Espoo.	
Carbon handprint (new innovations, research, products, and services that contribute to CO ₂ reductions elsewhere)	Caruna may provide a perfect test bed for flexibility services in electricity network. As an example, the dynamic connection of heat production site in Southern Espoo.				
Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)	The CO ₂ -neutral energy infrastructure for over 300 000 inhabitants is a world-class model for cities across Finland/Europe/World			The collaboration accelerate/ induce the systemic change and mindset: how to optimize the built environment to include all relevant infrastructure as natural part of sustainable, good life(style) for future inhabitants in Espoo.	



Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
Network investment : The Kivenlahti power line capacity increment in southern Espoo		~4 M€
Network investment : Hepokorpi-Finnoo power line, capacity increment from Northern to Southern Espoo		~35 M€
Continuous network investments in Espoo: Caruna will improve the network to enable new CO2-neutral electricity production and use for customers, today and in the future.		~10 M€/yr

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Finnpark is a Finnish conglomerate engaged in parking and real estate business, Finnpark conglomerate is owned by the City of Tampere.



Name of the organization: Finnpark Oy

Number of employees in total and in Espoo: total 73, Espoo 0

Main business area / line of activity: parking and real estate business

Company website: www.finnpark.fi

Contact person in climate collaboration (name and position): Minna Sola, Sustainability coordinator

Operations related to climate action: Finnpark has implemented EcoCompass environmental management system. We are actively enhancing our expertise and capabilities in the realm of sustainable mobility, with the aim of introducing an innovative Park & Ride product to the market. Finnpark is also committed to follow some of the UN 2030 agenda for sustainable development topics.

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action: We are one of the mobile payment service providers currently operating in Espoo on city-owned on-street parking spaces.

Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.





	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO ₂ reductions in Espoo)		<p>Our commitment to ecological responsibility is reflected in our efforts to minimize our carbon footprint. We carefully consider the environmental impact of our decisions, from developing sustainable mobility services to making eco-conscious choices in our properties. By reducing emissions associated with urban commuting and supporting alternative energy solutions, we aim to keep our carbon footprint as small as possible. The parking facilities running with the Moovy service are characterized by lower emissions compared to traditional, old-fashioned parking areas. This is because we offer a ticketless service and enable barrier-free locations, indirectly reducing the need for maintenance and the associated emissions.</p>			
Carbon handprint		<p>Our company takes pride in its positive carbon handprint.</p>			



<p>(new innovations, research, products, and services that contribute to CO2 reductions elsewhere)</p>		<p>Through the implementation of the EcoCompass system (EMS) and the development of eco-friendly solutions, we actively contribute to reducing carbon emissions. Our easy-to-use parking and navigation solutions help car users find parking efficiently, thereby reducing unnecessary driving and emissions. Furthermore, our support for alternative transportation energy solutions, including charging facilities and car-sharing services, enhances the adoption of greener transportation options, amplifying our carbon handprint.</p> <p>Green Parking - Park & Ride Service:</p> <p>Finnpark is actively enhancing its expertise and capabilities in the realm of sustainable mobility, with the aim of introducing an innovative Park & Ride product to the market. This initiative is designed to enhance the user experience of intermodal parking and potentially expand the user base for such services. It also seeks to provide more flexible intermodal parking solutions in areas where they are needed most. Through these efforts, we are making a positive impact by encouraging more environmentally friendly transportation choices and reducing the carbon footprint associated with commuting.</p>		
<p>Climate heartprint (changes in skills,</p>		<p>At the heart of our business is a genuine concern for the climate. We don't just aim to reduce harm; we aspire to</p>		



<p>capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)</p>		<p>make a positive impact. Our climate heartprint reflects our dedication to creating a more sustainable future. By facilitating eco-friendly mobility and encouraging the use of public transportation, we contribute to alleviating the strain on the environment. Our support for alternative energy solutions aligns with our commitment to a cleaner planet. Together, these efforts shape our climate heart print, demonstrating our passion for addressing climate challenges.</p> <p>In a functional city, people move and park their vehicles without burdening themselves or the environment, no stress in handling daily tasks, and no guilt about unnecessary driving.</p>		
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Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
Green Parking	Developing and launching the Green Parking service is a complex endeavor. Assessing the emissions impact of this service is challenging due to its	



	<p>scalability depending on the number of users. However, based on preliminary calculations, if intermodal parking with the service helps avoid private vehicle travel totaling 7.3 km, and this service is utilized by 1000 individuals, it could potentially save 193 CO2-equivalent kilotons of emissions annually.</p> <p>In this model, there is also the potential to implement carbon emissions trading</p>	

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Name of the organization: Business unit Renewables and Decarbonisation/ Fortum Power and Heat Oy / Fortum Heating and cooling Finland, territory: Espoo

Number of employees in total and in Espoo: Total approx. 5000

Main business area / line of activity: Fortum Power and Heat Ltd is part of Fortum Group. Fortum is a Nordic energy company. Fortum's purpose is to power a world where people, businesses and nature thrive together. We are one of the cleanest energy producers in Europe and our actions are guided by our ambitious environmental targets.

We generate and deliver clean energy reliably and help industries to decarbonise their processes and grow. Our core operations in the Nordics comprise of efficient, CO₂-free power generation as well as reliable supply of electricity and district heat to private and business customers. For our ~5 000 employees, we commit to be a safe, and inspiring workplace. Fortum's share is listed on Nasdaq Helsinki.

Fortum business structure consists of six business units.

Hydro Generation: Hydro Generation business unit is responsible for operating, maintaining and developing our hydropower assets.

Nuclear Generation: Nuclear Generation business unit operates, maintains and develops our fully owned Loviisa power plant and manages our ownership in the co-owned nuclear assets in Finland and Sweden.

Renewables and decarbonisation

Renewables and Decarbonisation is responsible for driving growth in wind and solar power through project development and execution. The unit is also responsible for the district heating and cooling business as well as decarbonization of heat production assets. Additionally, the unit develops Fortum's capabilities and projects in clean hydrogen in the Nordics.





Corporate Customers and Markets: Corporate Customers and Markets is responsible for hedging and value creation in both physical and financial power markets, locking in revenues for our power generation and managing supply for the Consumer Solutions unit. The unit is also the customer interface for large industrial customers.

Consumer Solutions: Consumer Solutions is responsible for offering energy solutions to consumers and small and medium-sized enterprises predominantly in the Nordics and Poland, including customer service and invoicing services.

Circular Solutions: Circular Solutions is responsible for operating, maintaining and developing our recycling and waste assets. The business unit is a separate entity from the other business units and develops its business stand-alone.

Company website: www.fortum.com

Contact person in climate collaboration (name and position): Mrs. Ulla Leppä, Head of Customers, Fortum Power and Heat Oy

Operations related to climate action: Fortum is committed to carbon neutrality and protecting biodiversity.

SBTi 1.5 °C

Emission reduction according to SBTi 1.5 °C trajectory

Specific emissions of <20 gCO₂/kWh for total energy production and < 10 gCO₂/kWh for power generation by 2028

Carbon neutrality

Carbon neutral by 2030 in all Scopes

Coal exit

Coal exit in own operations by the end of year 2027

Biodiversity

No net loss of biodiversity from existing and new operations in Scopes 1 and 2 from 2030 onwards, excluding all aquatic impacts

50% reduction in dynamic terrestrial impacts in upstream Scope 3 by 2030 compared to 2021

Commitment to continue local initiatives and develop science-based methodology with partners to assess the aquatic impacts of hydropower during 2023

With our Espoo Clean heat project, we are committed to be carbon neutral by 2030

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action: City of Espoo and Fortum have signed first version of Espoo Clean Heat (EHC) agreement on 2017, the agreement updated and re-signed on May 2023



Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

Table filled by Fortum Power and heat and focusing on decarbonizing heating. However, it is essential to notice that Fortum co-operates with City of Espoo also with most of the above mentioned business units

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO2 reductions in Espoo)	Heating generates over 40% of Espoo's CO2 emissions. ECH journey to CO2 neutral district heating will have huge impact on Espoo's carbon footprint				
Carbon handprint (new innovations, research, products, and services that contribute to CO2 reductions elsewhere)	Reusing Microsoft's DCs' excess heat on district heating production				
Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards					



a climate-neutral city)					
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Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

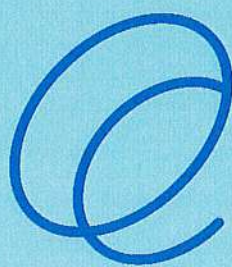
Table filled by Fortum Power and heat and focusing on decarbonizing heating. However, it is essential to notice that Fortum group level climate actions / targets can be seen above.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
Stop using coal on district heating latest by 2025	See our website: https://www.fortum.fi/yrityksille-ja-yhteisoille/lammitys-ja-jaahdytys/kaukolampo/kaukolampoa-yha-puhtaammin/kaukolammon-tuotantoluvut	
Have CO2 neutral district heating available by end of 2029	See our website: https://www.fortum.fi/yrityksille-ja-yhteisoille/lammitys-ja-jaahdytys/kaukolampo/kaukolampoa-yha-puhtaammin/kaukolammon-tuotantoluvut	
Investments on reusing Microsoft's DCs' excess heat		225 million Euros

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Laurea is a university of applied sciences operating in Uusimaa region with six campuses in Vantaa, Espoo, Hyvinkää, Lohja and Porvoo. Our operations focus on people and interaction. The foundation of our values is formed by openness, impact, and responsibility. Altogether, Laurea is an active community of about 9,900 students, 660 staff members and 34,700 alumni.

In our strategy sustainable development is one of the focal themes. We view our core values of effectiveness, responsibility, and openness through the United Nations' Sustainable Development Goals (SDGs) and take into account the ecological, social and economic impacts in all our activities.

The goal of Laurea's education activities is that Laurea's students and alumni are known as solution-oriented experts in sustainable development and circular economy and reformers of working life.

The goal of research, development, and innovation (RDI) activities is to provide new knowledge and solutions that support achieving broader SDG goals. Laurea also shares this competence widely in society through its business activities, including continuing education. Both education and RDI are integrated part of our commitment to sustainable growth and regional development in Uusimaa region, in Finland and broader international context.



AMMATTIKORKEAKOULU

University of Applied Sciences

Name of the organization: Laurea University of Applied Sciences

Number of employees in total and in Espoo: 253 fulltime and 36 part time employees.

Main business area / line of activity: Higher Education, RDI and Regional Development

Company website: www.laurea.fi/en

Contact person in climate collaboration (name and position): Kimmo Hannonen, Vice President





Operations related to climate action: Our RDI activities increase knowledge, skills and capabilities in sustainable development and circular economy.

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action:

Espoo is largest owner of Laurea University of Applied Sciences with 35 percent of shares.

Laurea has ongoing and past RDI projects in partnership with City of Espoo, Uusimaa region, other vocational and higher education institutions, as well as enterprises. These projects cover all Laurea’s research programmes and areas such as circular economy capabilities for companies, nature and pedagogy, migrants’ professional and social integration. Laurea is also most successful applied science university applying and carrying out EU funded RDI projects.

We expect to work together with City of Espoo in developing sustainable growth and regional development through higher and continuous education projects, RDI projects and living lab cooperation. We aim at cooperation that creates new knowledge, solutions systemic change for sustainable futures. We will continue and hope broaden the scope of our activities together with city of Espoo, various citizen groups and third sector organisations.

Key strategic priorities

Please describe shortly on Table 1 your organization’s role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste circular and economy	Built environment	Nature-based solutions
Carbon footprint (CO2 reductions in Espoo)		469,0 tCO2e		232,6 tCO2	
Carbon handprint (new innovations, research, products, and services that contribute to)			We implement a culture of experimentation and test sustainable development innovations through the Living Labs. As an example		



<p>CO2 reductions elsewhere)</p>			<p>Laurea's Circular Economy Living Lab serves as a collaborative platform, a learning and development environment.</p> <p>through its RDI activities, Laurea produces knowledge and creates operating models which support SDG achievement</p> <p>Laurea shares this competence widely in society through its business activities, including continuing education.</p> <p>Sustainable development policies and objectives are aligned with our fields of expertise through continuous SDG evaluation of our research projects and programmes and cross-cutting RDI themes.</p> <p>Laurea disseminates actively the sustainable development outcomes and findings of its RDI activities</p>		
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			<p>Laurea also integrates latest research outcomes and knowledge into education activities</p> <p>Through our RDI activities we produce sustainable development solutions and innovations for the needs of the region and our partners</p> <p>Our personnel's sustainable development expertise supports our RDI work</p> <p>We implement a culture of experimentation and test sustainable development innovations through the living Labs</p> <p>Our continuing education transfers expertise and sustainable development capabilities to our stakehol</p>		
<p>Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards</p>			<p>Learning outcomes with a particular focus on sustainable development are included in all of our degree programmes.</p>		



<p>a climate-neutral city)</p>			<p>Responsibility competences are considered to be general working life skills common to all degree programmes. They are developed systematically across all degree programmes.</p> <p>We support student entrepreneurship focusing on SD solutions.</p> <p>Laurea's operations are managed systematically to achieve the SDGs.</p> <p>Each member of the higher education community is aware of their responsibilities and acts accordingly.</p> <p>We ensure that everyone is familiar with the policies guiding our work on sustainable development and recognises their role in promoting them</p> <p>We implement, promote and monitor sustainable development as part of our strategic choices</p>		
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			<p>and development projects.</p> <p>We define sustainability targets for development projects annually and monitor progress made in them as part of the operational and financial plan</p> <p>We challenge our enthusiastic higher education community to co-create sustainable development solutions and innovations that support the achievement of our goals</p> <p>Our sustainable development activities are student-centred and conducted in cooperation with the entire higher education community.</p> <p>Our teaching personnel's sustainable development expertise is developed systematically</p> <p>The development of expertise takes place as part of national universities of applied sciences cooperation but</p>		
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			<p>also through Laurea's own training at Laurea</p> <p>The personnel's sustainable development expertise is included in each employee's personal goals. Personnel's sustainable development expertise is measured through regular national (UAS) survey</p> <p>Students' sustainable development initiatives are promoted in a dialogue with the student union</p> <p>We centralise our communication related to promoting sustainable development goals and make it transparent with the help of a new website</p> <p>We ensure that our resources are used responsibly in investment activities</p> <p>We look after the well-being of the higher education community's members and, as a responsible employer,</p>		
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			provide the preconditions for working and studying sustainably		
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Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
Laurea aims at being carbon-neutral higher education institution 2030. To achieve this Laurea calculates its carbon footprint annually and uses this information to develop facilities management and for new facilities.		
<p>Sustainable catering We influence our carbon footprint by choosing sustainable catering services</p> <p>We exert influence by sharing information and good practices related to responsible catering services</p> <p>The food served at the campus restaurants is mainly locally produced and plant-based</p> <p>We reduce food losses by improving our ability to predict the customer numbers at our campus restaurants</p>		
<p>Sustainable Mobility The size of the carbon footprint create by our mobility supports our goal of We favour public transport in our travel practices</p>		

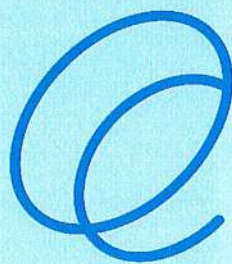


<p>When planning trips abroad, we ensure through reporting that the trip promotes the Laurea's strategic goals.</p> <p>We use digitalisation, virtual environments and telework appropriately in the activities of the higher education community and in our cooperation with regional and international partners the campuses, as well as between the different campuses, to support the reduction of the carbon footprint</p> <p>We create new solutions for sustainable mobility in cooperation with students and the UAS network in order to reduce climate impacts</p>		
<p>Sustainable Facilities</p> <p>Our campuses are energy-efficient, and we utilise renewable energy sources. Proper maintenance and regular services as well as sustainable procurements ensure that our campuses have a long and efficient life cycle. Sustainable development goals and measures have been specified for property maintenance services, and we monitor their achievement together with our service partners</p> <p>Rather than procuring new items, we primarily use repair and renovation services when furniture and equipment reach the end of their life cycle. As far as possible, we recycle responsibly any furniture and equipment that Laurea can no longer use.</p> <p>We improve the at-source sorting of wastes by means of enabling and guidance, set requirements for further treatment, and take various measures to prevent the generation of waste</p>		

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Appendix: Individual Signatory Commitments

In this document city of Espoo's climate work partner describes their work and commitments that contribute to the goal of climate-neutral Espoo by 2030. This document will be attached to Espoo's Climate City Contract. This document may be updated and developed when working towards target year 2030. An update will be submitted to European Commission every two years for assessment.

NCC is the construction company with the ability to manage the complexity of a construction process from start to finish, creating a positive impact on society and supporting its positive transformation. NCC builds schools, hospitals, roads, bridges, houses, offices and a lot more.



Name of the organization:

NCC Suomi Oy, NCC Property Development Oy and NCC Industry Oy

Number of employees in total and in Espoo:

totally 1600 employees in Finland of which varying number in Espoo

Main business area / line of activity:

construction and property development

Company website: <https://www.ncc.com>

Contact person in climate collaboration (name and position):

Pekka Kiuru, Sustainability Manager

Operations related to climate action:

property development, project development, construction

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action:

development of sustainable neighbourhoods for business, residential and public clients' needs



Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO2 reductions in Espoo)		one-stop-shop for stone quarries to cut transports (e.g. landfill or concrete in and stone or recycling out)		development and realization of low-carbon residential and office buildings	
Carbon handprint (new innovations, research, products, and services that contribute to CO2 reductions elsewhere)				wooden building frames as carbon storage	
Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)	local district heating system using renewable energy			competence centre for low-carbon and resource-efficient construction, education, KPIs, targets and incentives	



Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO₂ reductions and the estimated need of investment.

Climate action	Estimated yearly CO ₂ reductions (kt CO ₂ -ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
NCC's competence centre for low-carbon and resource-efficient construction		
Development and realization of low-carbon office buildings		
Development and realization of low-carbon residential buildings		

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Appendix: Individual Signatory Commitments

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Ramirent is a leading company offering machinery rental for construction and other services, the public sector and households.

RAMIRENT

Name of the organization: Ramirent Finland Oy

Number of employees in total and in Espoo: approx. 650 and in Espoo 10

Main business area / line of activity: Machinery Rental and services

Company website: www.ramirent.fi

Contact person in climate collaboration (name and position): Nina Pirinen Development Manager

Operations related to climate action: Climate actions cover all of our operations

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action: The smart and clean-collaborative Kera project. The projects supports the creations of the Kera district, that is based on carbon-neutral circular economy.



Key strategic priorities

Please describe shortly on Table 1 your organization’s role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO2 reductions in Espoo)			Zero emission machinery rental	Service provider for construction and infrastructure	
Carbon handprint (new innovations, research, products, and services that contribute to CO2 reductions elsewhere)			We provide Zero emission machinery rental for our customers	We provide Zero emission machinery rental for our customers	
Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)			Increase of zero-emission machinery capex, green fleet-productline.	Increase of zero-emission machinery capex, green fleet-productline.	

Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO₂ reductions and the estimated need of investment.

Climate action	Estimated yearly CO ₂ reductions (kt CO ₂ -ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
Reduction of our direct emissions between 2019 and 2030 -50 % (SBTi)		
Reduction of our indirect emissions between 2019 and 2030 -30 % (SBTi)		
Ramirent has signed and committed to European commission Green Deal agreement (Climate Neutral EU 2050)		

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SRV





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In this document city of Espoo's climate work partner describes their work and commitments that contribute to the goal of climate-neutral Espoo by 2030. This document will be attached to Espoo's Climate City Contract. This document may be updated and developed when working towards target year 2030. An update will be submitted to European Commission every two years for assessment.

SRV is a developer and innovator in the construction industry. SRV's objective is a new lifecycle-wise reality where solutions related to construction ensure well-being, financial value and the benefit of users, residents and environment – for years and generations to come. SRV's genuine cooperation and enthusiasm for our work comes across in every encounter. Sustainability is reflected in all our activities.

SRV is Finland's leading project management contractor. SRV develops and build commercial and business premises, residential units as well as infrastructure and logistics projects. SRV operates in selected growth centres in Finland.

SRV, established in 1987, is listed on the Helsinki Stock Exchange. SRV operates in growth centres in Finland. In 2022, our revenue totalled EUR 770.1 million. In addition to approximately 1,000 in-house staff, we have a network of around 3,800 partners.



Name of the organization: SRV Group Plc.

Number of employees in total and in Espoo: 792 in total and 200 in Espoo

Main business area / line of activity: Development and construction

Company website: www.srv.fi

Contact person in climate collaboration (name and position):

Saku Sipola, President and CEO

Miimu Airaksinen, Senior Vice President, Development

Operations related to climate action:

SRV has a strategic programme called Lifecycle-wise Future. SRV develops building concepts focusing on minimising carbon footprint and maximising carbon handprint. The concept includes also urban green and biodiversity focusing on increasing human well-being in cities. The building concept includes energy system and building materials aiming for sustainable systemic change in the whole value change.



SRV has also developed its own construction operations, with all sites reaching net zero emissions as from the beginning of 2022. Last year, SRV was able to eliminate 75 per cent of all emissions during the year, and achieved net-zero emissions by compensating for the remaining emissions by planting trees as carbon sinks.

SRV also launched biodiversity targets and a long-term objective to be a carbon-neutral company by 2030. These are major steps towards a lifecycle-wise future. In addition, SRV updated its sustainability programme for 2023. The sustainability programme is based on the ESG (Environmental, Social, Governance) framework and uses it to communicate its objectives in these three areas.

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action: Currently SRV and City of Espoo have a project based regular co-operation in city development. One of the recent activities is also a joint development meeting on low-carbon district as well as the development of biodiversity metrics in urban areas.

Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO ₂ reductions in Espoo)	SRV's lifecycle-wise building concept aims to smart energy use in buildings.		SRV's lifecycle-wise construction site concept utilises efficiently materials and recycles materials together with the co-operation partners	SRV's lifecycle-wise building concept reduces the carbon footprint by 50-60% on average compared to a typical state-of-the-art building	SRV's lifecycle-wise building concept highlights the importance of nature based solutions. The concept has guidelines for biodiversity rich urban gardens increasing well-being, reducing urban heat islands, and improving local air quality as well as reducing urban flooding
Carbon handprint (new innovations, research,	SRV's lifecycle-wise buildings use typically renewable energy sources.		SRV's lifecycle-wise construction site concept seeks new innovations to	SRV's lifecycle-wise building concept increases the carbon handprint	

<p>products, and services that contribute to CO2 reductions elsewhere)</p>			<p>recycle materials for new products together with the co-operation partners. In addition SRV's lifecycle-wise building uses materials from recycled raw materials.</p>	<p>by using renewable energy sources as well as renewable materials</p>	
<p>Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)</p>	<p>SRV's customer promise is "By listening we build wisely". SRV is actively engaging its clients and stakeholders to understand better the users' needs and the perceived urban environment.</p> <p>In addition, SRV is active in discussions with city municipalities and other actors in the value chain to build know-how and skills together to enable systemic change towards climate neutral city.</p>	<p>SRV's customer promise is "By listening we build wisely". SRV is actively engaging its clients and stakeholders to understand better the users' needs and the perceived urban environment.</p> <p>In addition, SRV is active in discussions with city municipalities and other actors in the value chain to build know-how and skills together to enable systemic change towards climate neutral city.</p>	<p>SRV's customer promise is "By listening we build wisely". SRV is actively engaging its clients and stakeholders to understand better the users' needs and the perceived urban environment.</p> <p>In addition, SRV is active in discussions with city municipalities and other actors in the value chain to build know-how and skills together to enable systemic change towards climate neutral city.</p>	<p>SRV's customer promise is "By listening we build wisely". SRV is actively engaging its clients and stakeholders to understand better the users' needs and the perceived urban environment.</p> <p>In addition, SRV is active in discussions with city municipalities and other actors in the value chain to build know-how and skills together to enable systemic change towards climate neutral city.</p>	<p>SRV's customer promise is "By listening we build wisely". SRV is actively engaging its clients and stakeholders to understand better the users' needs and the perceived urban environment.</p> <p>In addition, SRV is active in discussions with city municipalities and other actors in the value chain to build know-how and skills together to enable systemic change towards climate neutral city.</p>



Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)

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Appendix: Individual Signatory Commitments

In this document city of Espoo's climate work partner describes their work and commitments that contribute to the goal of climate-neutral Espoo by 2030. This document will be attached to Espoo's Climate City Contract. This document may be updated and developed when working towards target year 2030. An update will be submitted to European Commission every two years for assessment.

VTT Technical Research Centre of Finland Ltd is one of Europe's leading research institutions. We advance the utilisation and commercialisation of research and technology in commerce and society. Through scientific and technological means, we turn large global challenges into sustainable growth for businesses and society. We bring together people, business, science and technology to solve the biggest challenges of our time. This is how we create sustainable growth, jobs and wellbeing and bring exponential hope.

VTT is owned by the Finnish state, steered by the Ministry of Economic Affairs and Employment.



Name of the organization: VTT Technical Research Centre of Finland Ltd

Number of employees in total and in Espoo: 2213 / 1612

Main business area / line of activity: Research

Company website: <https://www.vttresearch.com/>

Contact person in climate collaboration (name and position):

Mari Hukkalainen, Senior Scientist

Operations related to climate action:

Research focus on 1) Carbon neutral and flexible energy systems, 2) Sustainable and smart built environment, and 3) Low carbon and smart mobility.

Existing collaboration with the City of Espoo and expectations for future collaboration related to climate action:

As a sign of mutual, strategic benefits of collaboration, VTT and Espoo have signed a Strategic Partnership Agreement. Collaboration includes regular high-level meetings as well as operative management meetings to steer and coordinate the joint efforts. Over the years,



Espoo and VTT have partnered in several large European and Finnish research projects on the topics related to climate action. Among others, one of these projects is an EU funded SPARCS project where the city of Espoo is one of the lighthouse cities, and in this role Espoo is developing examples for decarbonising local energy systems through positive energy district and smart city solutions (<https://sparcs.info/en/>).

Key strategic priorities

Please describe shortly on Table 1 your organization's role in the key areas of climate work in Espoo. You may fill in information only in the domains that are relevant to your organization.

	Energy systems	Mobility and Transport	Waste and circular economy	Built environment	Nature-based solutions
Carbon footprint (CO2 reductions in Espoo)	Continuous research collaborations on technical development, innovation and demonstration projects in various fields in the area of Espoo city.				
Carbon handprint (new innovations, research, products, and services that contribute to CO2 reductions elsewhere)	<p>Research on Integrated and smart low carbon energy systems, focusing on:</p> <p>1)Sector integration enabling flexibility, resiliency and new business in energy</p> <p>2)Energy management in districts and buildings</p> <p>3)Intelligent grids with distributed</p>	<p>Research on Smart and sustainable mobility and transport systems and services, focusing on:</p> <p>1)Feasible electrification in different modes of transportation</p> <p>2)Public and on-demand mobility services based on digital modelling and simulation and traffic</p>	<p>Research on</p> <p>1)Circular built environment</p> <p>2)Circular economy business model development and innovations, new sharing and value creation models, and value chains in circular economy, implementation of new business models and enabling technologies, such as effective data</p>	<p>Research on</p> <p>1)Circular built environment</p> <p>2)Building and construction metaverse</p> <p>From digitalization to actionable intelligence for informed decision making. Citizens as decision making partners – from citizen engagement and social innovation to co-creation</p>	<p>Reliable, scientifically sound innovation & advice in support of the development & implementation of nature-based, engineered and integrated infrastructure as well as evidence-based policy advice towards just transformation to a climate-resilient society</p>

	assets and active consumers	data ecosystems 3) automated and connected vehicles	sharing across organisations	3)Sustainability of building stocks and resilience to natural and man-made hazards	
Climate heartprint (changes in skills, capabilities, mindsets, and actions needed for systemic change towards a climate-neutral city)	<p>By its public mandate, VTT has a strong societal role. We engage in active cooperation between stakeholders (companies, universities and colleges, research institutes, research funding agencies, ministries, municipal and regional administration) in order to foster regular information flows and a common vision of Finland's priority areas. We work in close collaboration with industry and highlights the renewal of industrial value chains and sustainable competitiveness in Finland and Europe.</p> <p>Furthermore, we support public decision making by providing scientific studies and calculations for authorities. We also facilitate public sector to understand the innovation needs of different industrial sectors. Our research and innovation actions bring value broadly to Finnish society and industry.</p>				

Main climate actions

List and describe shortly main climate actions your organization is committed to that contribute to the goal of climate-neutral Espoo by 2030. If applicable, list also the estimated yearly CO2 reductions and the estimated need of investment.

Climate action	Estimated yearly CO2 reductions (kt CO2-ekv) and the reduction year (if applicable)	Estimated need of investments (€) and year (if applicable)
VTT's target is to become carbon neutral by 2030. Main GHG sources include electricity and heat consumption at our facilities as well as travelling. The actions for reducing our emissions include improvement of energy efficiency and supply of renewable heat and	In 2022 VTT's GHG emissions were : scope 1: 0,17 kt CO2 eq scope 2: 1,8 kt CO2 eq	



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electricity. Other actions are under evaluation.	scope 3: 3,8 kt CO2 eq Target is to become carbon neutral by 2030.	
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Climate City Contract

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Climate Neutrality Commitments of City of Espoo



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Additions to Climate City Contract submitted on 15 September, 2023

This document is to be considered complementing Espoo Climate City contract submitted on 15 September 2023, as signatures from these organisations were received after that.

In addition to 3 new organisations committing to Espoo Climate City Contract also **National commitment to Climate City Contracts** for EU Mission document, in both English and Finnish (with signatures), is attached.

5 Signatories

Name of the institution	Sector/Area	Legal form	Name of the responsible person	Position of the responsible person
Climate Leadership Coalition	climate business network	non profit	Tuuli Kaskinen	CEO
Kemira	chemical solutions	Public limited company	Petri Castrén	Interim President & CEO, CFO
Neste	oil refining and marketing	Public limited company	Minna Aila	Executive Vice President, Sustainability and Corporate Affairs

For individual Signatory commitments final deadline has been set to March, 2024.
No individual signatory commitments from above-mentioned organizations are attached.

6 Contract with signatures





National commitment to Climate City Contracts for EU Mission on Climate-neutral and Smart Cities

Background for national-level participation in the mission

EU missions are a new collaborative approach developed under Horizon Europe to address some of the greatest challenges of our time. One of the five missions launched by the European Commission in 2021 is to “deliver 100 climate-neutral and smart cities by 2030”, or the Cities Mission (referred to as the Climate Mission below). Based on an open call conducted by the Commission, six Finnish cities were selected to be among the 100 European cities participating: Tampere, Turku, Helsinki, Espoo, Lahti and Lappeenranta.

The six Finnish cities of the Climate Mission are committed to leading the way by being some of the first cities to achieve carbon neutrality by 2030 and by acting as centres for experimentation and innovation. At the same time, the cities are supporting and promoting Finland’s achievement of the national goal of climate neutrality by 2035. According to emission calculations by the Finnish Environment Institute, the six cities were able to reduce their per capita CO₂ emissions by an average of 47% between 2007 and 2023.

Cities play a key role in achieving carbon neutrality, as their active climate work contributes directly to emission reductions in various sectors. Cities can actively influence the amount of their own greenhouse gas emissions (carbon footprint) and, in many ways, promote and accelerate emission reductions (carbon handprint) among residents, companies, communities and other stakeholders. Key areas in this include the energy system, transport, city planning, construction, carbon sinks and public procurement. Cities offer great opportunities for pioneering and innovation, as well as networks of operators. The largest cities also have significant in-house development resources, expertise and opportunities to invest in sustainable solutions and infrastructure.

The Finnish cities participating in the Climate Mission have prepared a Climate City Contract (CCC), which will be concluded with the European Commission. It is strongly recommended that Climate City Contracts be built on three levels, including the national level. In several other EU countries, the ministry level has entered or is entering into the Climate City Contract. The primary purpose of the national-level commitment is to better link national and city-level actions in climate policy through close vertical coordination. Thus, the mission provides a strategic alliance of climate work between cities and central government.

In order to stay on the emissions reduction path, we need more and stronger cooperation and partnerships between central government and cities. Traditionally, central government can support cities through legislation, economic steering measures or by sharing information and information steering. These can be strengthened and developed with new measures and tools to support and empower cities’ climate action. Through joint and systematic climate work, Finland can create a new competitive advantage and thereby improve the international competitiveness of our country. Environmentally sustainable solutions, the circular economy, energy efficiency, the transition to renewable energy and the related development work all create new innovations, jobs and export opportunities for Finland.

The Government Programme emphasises climate and energy policy and zero-emission solutions as well as co-operation for stopping the biodiversity loss. It places particular emphasis on the carbon handprint and nature handprint, which can be significantly

increased and promoted by concrete measures, as cities are export drivers and testbeds for smart climate solutions.

At the application stage of the Climate Mission, the national level was strongly involved in supporting the Finnish mission cities, and the Ministry of Economic Affairs and Employment drafted support letters for the Finnish cities that expressed interest in the mission. A national Climate Mission network has been established in Finland to bring all relevant actors to the same table for discussions, information sharing and cooperation. The network has also supported the Finnish mission cities in concrete terms by launching a co-creation project to support the cities' work. The aim of the project is to help, in a targeted way, the Finnish mission cities to prepare and carry out effective climate action, as well as to provide support for the joint preparation of the outputs required by the mission.

Commitment of the national authority

With this contract appendix, the national authorities undertake, within the framework of the Climate Mission, to contribute to the transformation of the cities into climate-neutral entities that use smart solutions for climate work by 2030. The national authorities strive to do this through their own national actions, which complement the actions of the cities themselves.

An ambitious climate policy and investments in the green transition will strengthen the Finnish economy both immediately and in the longer term. Green investments will create work in Finland during the construction phase, but they will keep increasing the domestic value added even after their completion. In addition to the emergence of new production, the abandonment of fossil fuels will make the Finnish economy more domestic and also more stable and predictable in relation to the fluctuations of the global market.

According to the Finnish Climate Change Act, the national carbon neutrality target will be achieved in 2035. The climate emission reduction targets are 60% from the 1990 level by 2030, 80% by 2040 and 90–95% by 2050. The Climate Change Act identifies the significant role and obligation of cities and municipalities in achieving these climate targets.

According to the EU's Effort Sharing Regulation, by 2030 Finland should reduce emissions from the effort sharing sector by 50% from the 2005 level. The Medium-term Climate Change Policy Plan (KAISU) will be updated during the term of Petteri Orpo's government in accordance with the Climate Change Act. In connection with the update, the objectives for the different sectors and the necessary new measures will be reviewed.

Measures of the national authority

The participation of national authorities through various measures includes direct and indirect actions in support of the mission cities. Here, support is understood in a broad sense and may take the form of, for example, policy support (parallel objectives and their reinforcement), the identification and compilation of existing initiatives in support of the Climate Mission (indirect funding), or the channelling of cities into possible financial instruments.

Some key measures of the national authority to support the Climate Mission cities in achieving their objectives in the coming years are presented below.

Medium-term Climate Change Policy Plan

According to the Finnish Climate Change Act, the Government must adopt a Medium-term Climate Change Policy Plan (KAISU) each parliamentary term. The objective of the plan is the carbon neutrality of the whole of Finland by 2035. The preparation of the new Medium-term Climate Change Policy Plan has started with the updating of the baseline projections for different sectors. After updating the baseline projections, evaluations of the necessary

new measures will be made, taking into account the Government Programme. The emission reduction effects and financing needs of the new measures will be assessed at the same time. The planning of new measures will also take into account the situation and needs of cities with ambitious climate policies.

Climate and energy strategy

A climate and energy strategy is being prepared. The strategy will cover all of the sources of greenhouse gas emissions (emissions trading sector, effort sharing sector, land use sector) and sinks (land use sector). The preparation of the climate and energy strategy emphasises emission reduction measures, a well-functioning energy market, clean electricity production and Finland's energy security as part of the sustainability transition. Impacts related to society and competitiveness are also at the heart of the strategy. Finland's goal is to increase its climate handprint and to advance its carbon neutrality through effective and sustainable means. A smooth permit process is a prerequisite for the creation of clean investments.

Municipal Climate Change Solutions Programme

The Municipal Climate Solutions Programme accelerates, promotes and funds local climate work. So far, the programme has funded nearly 150 different climate projects around Finland, and it will continue until the end of 2024. The programme has brought the climate work of municipalities and regions to the centre stage of the preparation and implementation of national climate policy.

Agreements concerning land use, housing and transport

The agreement procedure concerning land use, housing and transport (MAL) with the seven largest city regions will be continued to strengthen the partnership between the government and the city regions in related matters. Agreements concerning land use, housing and transport promote a low-carbon and sustainable urban structure and transport system, the digitalisation of transport and the planning of residential areas and housing production to meet the need. The agreements ensure the prerequisites for the growth and accessibility of city regions through investments in infrastructure and housing production. A denser community structure makes it possible to mitigate climate change, reduce greenhouse gas emissions and the consumption of natural resources, as well as prevent the reduction of carbon sinks. The central government finances the state subsidies of agreements concerning land use, housing and transport.

Ecosystem agreements

The main objective of ecosystem agreements is innovative and pioneering cities that, based on their strengths, take advantage of the opportunities offered by digitalisation, other new technologies and carbon neutrality in order to achieve sustainable growth. Approximately five (5) of the 16 city regions with ecosystem agreements have direct content in their agreement providing for the development of climate change mitigation and smart solutions. This makes ecosystem agreements one of the important government instruments to support the implementation of the Climate Mission, especially from the point of view of the carbon handprint.

Business Finland/Decarbonized Cities Programme

The objective of the Decarbonized Cities Programme is for ten cities worldwide to significantly reduce their carbon emissions thanks to Finnish expertise by 2030. Competence in integrated system solutions is key to achieving this goal, and it will also give a concrete boost to the carbon handprint beyond the borders of Finland.

Circular Economy Programme

The Circular Economy Programme aims at the sustainable use of natural resources. The network of expertise on the circular economy (KiSu) supports municipalities and companies in, for example, finding funding opportunities as well as through education and co-creation projects. Currently, ministries, research institutes, 20 municipalities and a number of regions

and key industries are preparing a proposal for a voluntary commitment to promote the circular economy. In this “green deal” process, they make assessments of future directions and goals and develop together the most effective measures to promote the circular economy. The objective is a circular economy commitment for the whole of Finland.

Energy aid and energy efficiency

The objective of energy aid is to promote the development of new and innovative solutions for achieving a low-carbon energy system in the long term. Energy aid can be granted to companies and communities of all sizes, such as municipalities, parishes and foundations. Energy aid can be granted for investment or research projects that promote energy savings or efficiency in energy production or use. The aid is granted by Business Finland or the Ministry of Economic Affairs and Employment.

Networking to achieve sustainable and climate-neutral development

The government has launched networks to pursue carbon neutrality, which support and provide members of the networks with expert assistance, information and development ideas, as well as implementing the government's goals for strengthening a climate-neutral society.

Towards Carbon Neutral Municipalities (HINKU) is a network that brings together municipalities with ambitious aims to reduce greenhouse emissions, businesses that offer environmentally friendly products and services, and climate and energy experts. The HINKU network involves nearly 100 municipalities and five regions. The network shares information on best practices in climate change mitigation, supports municipal climate work and creates demand for climate-friendly products and services.

Finnish Sustainable Communities (FiSu) is a network of resource-smart pioneering cities and municipalities striving for zero emissions, zero waste and globally sustainable consumption. The aim of the network is to help develop new low-emission operating methods and solutions that build sustainable wellbeing and growth based on local strengths.

Duration and nature of the commitment

The commitment is a cooperation document through which the government demonstrates its support for the work of the Climate Mission cities and the will to cooperate with the cities that have signed a Climate City Contract. It does not formally bind the parties, for example to funding. The commitment can be updated, if necessary, in addition to the updates of the cities' Climate Contracts every two years. This document serves as a contract appendix for the cities that have drawn up a Climate City Contract.

Signatures

The Ministry of Economic Affairs and Employment and the Ministry of the Environment make the commitment on behalf of the national authority

Petri Peltonen
Secretary of State (acting)
Ministry of Economic Affairs and Employment
Finland

Juhani Damski
Secretary of State
Ministry of the Environment
Finland

Ilmastoneutraalit ja älykkäät kaupungit –missiossa solmittavien ilmasto-kaupunkisopimusten (Climate City Contract) kansallinen sitoumus

Tausta kansallisen tason missioon osallistumiselle

EU:n missiot ovat Horisontti Eurooppa –puiteohjelmassa kehitetty uusi yhteistyöhön perustuva lähestymistapa, jolla pyritään ratkomaan joitakin aikamme suurimpia haasteita. Yksi näistä EU:n komission vuonna 2021 käynnistämästä viidestä missiosta on ”luoda 100 ilmastoneutraalia ja älykästä kaupunkia vuoteen 2030 mennessä”, eli nk. kaupunkimissio (jäljempänä ilmastomissio). Komission toteuttaman avoimen haun pohjalta 100 eurooppalaisen osallistujakaupungin joukkoon valittiin kuusi suomalaista kaupunkia, Tampere, Turku, Helsinki, Espoo, Lahti ja Lappeenranta.

Ilmastomission kuusi suomalaista kaupunkia ovat sitoutuneet olemaan edelläkävijöitä: saavuttamaan hiilineutraaliuden ensimmäisten kaupunkien joukossa viimeistään vuonna 2030, sekä toimimaan kokeilu- ja innovaatiokeskuksina. Samalla ne tukevat ja nopeuttavat Suomen pääsemistä kansalliseen tavoitteeseen olla ilmastoneutraali maa vuoteen 2035 mennessä. Vuosina 2007-23 nämä kaupungit ovat SYKE:n päästölaskennan mukaan pystyneet vähentämään asukaskohtaisia co2-päästöjään keskimäärin 47 prosenttia.

Kaupungit ovat avainasemassa hiilineutraaliuden saavuttamisessa, sillä niiden aktiivinen ilmastotyö edistää eri sektoreiden päästövähennyksiä suoraan. Kaupungit voivat aktiivisesti vaikuttaa omien kasvihuonekaasupäästöjensä määrään (hiilijalanjälki), sekä monin tavoin edistää ja vauhdittaa asukkaiden, yritysten, yhteisöjen ja muiden sidosryhmiensä päästövähennyksiä (hiilikädenjälki). Keskeisimpiä osa-alueita tässä ovat esimerkiksi energiasjärjestelmä, liikenne, kaavoitus, rakentaminen, hiilinielut ja julkiset hankinnat. Kaupungeista löytyvät edelläkävijyyden ja innovoinnin suuret mahdollisuudet ja toimijaverkostot. Isoimmilla kaupungeilla on myös merkittävästi omia kehittämisresursseja, osaamista ja mahdollisuuksia investoida kestäviin ratkaisuihin ja infrastruktuuriin.

Suomalaiset ilmastomissio kaupungit ovat valmistelleet ilmastokaupunkisopimusta (CCC), joka solmitaan EU:n komission kanssa. CCC-sopimus suositellaan vahvasti rakennettavaksi kolmitasoisena sisältäen myös kansallisen tason. Useammassakin muussa EU-maassa ministeriötaso on tullut tai tulossa mukaan sopimukseen. Kansallisen tason sitoumuksen perusajatuksena on linkittää paremmin ilmastopolitiikan kansalliset ja kaupunkitaso toisiinsa läheisen vertikaalisen koordinaation kautta. Siten missio tarjoaa ilmastotyön strategisen liiton kaupunkien ja valtion välillä.

Jotta päästövähennyspolulla pysytään, tarvitaan lisää ja vahvempaa valtion ja kaupunkien yhteistyötä ja kumppanuutta. Valtio voi perinteisesti tukea kaupunkia lainsäädännön avulla, taloudellisilla ohjaukeinoilla tai jakamalla tietoa ja informaatio-ohjausta. Näitä voidaan vahvistaa ja kehittää uusilla toimenpiteillä ja välineillä, jotka tukevat ja kiihättävät kaupunkien ilmastotoimia. Yhteisellä suunnitelmallisella ilmastotyöllä Suomen on mahdollista luoda uutta kilpailuetua ja samalla parantaa maamme kansainvälistä kilpailukykyä. Ympäristökestävät ratkaisut, kiertotalous, energiatehokkuus ja uusiutuvaan energiaan siirtyminen sekä niihin liittyvä kehittämistyö luovat Suomelle uusia innovaatiota, työpaikkoja ja vientimahdollisuuksia.

Hallitusohjelmassa korostetaan ilmasto- ja energiapolitiikkaa ja nollapäästöratkaisuja, sekä luonnon monimuotoisuuden heikentymisen pysäyttämistä yhteistyöllä. Erityisesti painotetaan hiilikädenjälkeä ja luontokädenjälkeä, jota kaupunkien toimilla voidaan merkittävästi

suurentaa ja konkretisoida, sillä kaupungit ovat älykkäiden ratkaisuiden testausalustoja ja viennin li-sääjiä.

Ilmastomission hakuvaiheessa kansallinen taso oli vahvasti mukana tukemassa suomalaisia missiokaupunkeja, ja työ- ja elinkeinoministeriö laati tukikirjeet missiokaupunkeiksi Suomesta hakeneille. Suomeen on perustettu ilmastomission kansallinen verkosto, jonka tarkoituksena on tuoda kaikki asian kannalta tärkeät toimijat saman pöydän ääreen keskustelemaan, jakamaan tietoa ja tekemään yhteistyötä. Verkosto on myös konkreettisesti tukenut suomalaisia missiokaupunkeja käynnistämällä yhteiskehittämisen tuen hankkeen kaupunkien työn tueksi. Hankkeen tavoitteena on räätälöidysti auttaa suomalaisia missiokaupunkeja valmistelemään ja toteuttamaan vaikuttavia ilmastotoimia ja antaa tukea mission edellyttämien tuotosten yhteisvalmisteluun.

Valtio-osapuolen sitoumus

Tällä sopimusliitteellä valtion osapuolet sitoutuvat ilmastomission puitteissa omalta osaltaan edistämään kaupunkien muutosta ilmastoneutraaleiksi ja älykkäitä ratkaisuja ilmastotyössä hyödyntäviksi vuoteen 2030 mennessä. Valtion osapuolet pyrkivät tähän omilla kansallisilla toimillaan, jotka täydentävät kaupunkien omia toimia.

Kunnianhimoinen ilmastopolitiikka ja vihreän siirtymän investoinnit vahvistavat Suomen taloutta sekä välittömästi että pidemmällä aikavälillä. Vihreät investoinnit luovat rakennusvaiheessa työtä Suomeen, mutta kasvattavat kotimaista arvonlisäystä, myös valmistumisen jälkeen. Uuden tuotannon syntymisen lisäksi fossiilisista polttoaineista luopuminen tekee Suomen taloudesta kotimaisemman ja myös vakaamman ja ennakoitavamman suhteessa maailmanmarkkinoiden heilahduksiin.

Suomen ilmastolain mukaan kansallinen hiilineutraaliustavoite saavutetaan vuonna 2035. Ilmastopäästötavoitteet vuoden 1990 tasoon verrattuna ovat -60% vuoteen 2030 mennessä, -80% vuonna 2040 ja -90-95% vuonna 2050. Ilmastolaissa on tunnistettu kaupunkien ja kuntien merkittävä rooli ja velvollisuus ilmastotavoitteiden saavuttamisessa.

EU:n taakanjakoasetuksen mukaan Suomen on vähennettävä taakanjakosektorin päästöjään 50 prosenttia vuoden 2005 tasosta vuoteen 2030 mennessä. Keskipitkän aikavälin ilmastosuunnitelma (KAISU) tullaan päivittämään Petteri Orpon hallituskaudella ilmastolain mukaisesti. Päivityksen yhteydessä tarkistetaan eri sektoreita koskevat tavoitteet ja tarvittavat uudet toimenpiteet.

Valtio-osapuolen toimenpiteitä

Valtio-osapuolten osallistuminen eri toimenpiteillä käsittää suoraan ja epäsuoraan missiokaupunkeja tukevia toimia. Tuki käsitetään tässä laajassa mielessä ja sen muodot voivat olla esim. politiikkatukea (yhdensuuntaiset tavoitteet ja niiden voimistaminen), olemassa olevien aloitteiden tunnistamista ja kokoamista ilmastomission tueksi (epäsuora rahoitus), tai kaupunkien ohjaamista mahdollisten rahoitusvälineiden piiriin.

Alla on esitetty joitakin keskeisiä valtio-osapuolen toimenpiteitä, joilla tulevina vuosina voidaan tukea ilmastomissiokaupunkien tavoitteiden saavuttamista.

Keskipitkän aikavälin ilmastosuunnitelma

Suomen Ilmastolain mukaan valtioneuvosto hyväksyy kerran vaalikaudessa keskipitkän aikavälin ilmastosuunnitelman (KAISU). Suunnitelman tavoitteena on koko Suomen hiilineutraalius vuonna 2035. Uuden Keskipitkän aikavälin ilmastosuunnitelman laatiminen on käynnistynyt eri sektoreiden perusennusteiden päivittämisellä. Perusennusteiden päivittämisen jälkeen tehdään arviot tarvittavista uusista toimenpiteistä hallitusohjelmakirjaukset huomioon ottaen. Samalla arvioidaan uusien toimien päästövähennysvaikutukset sekä

rahoitustarpeet. Uusien toimien suunnittelussa pyritään huomioimaan myös ilmastopolitiikaltaan kunnianhimoisten kaupunkien tilanne ja tarpeet.

Energia ja ilmastostrategia

Energia- ja ilmastostrategia on valmistelussa. Strategia kattaa kaikki kasvihuonekaasupäästölähteet (päästökauppasektori, taakanjakosektori, maankäyttösektori) ja nielut (maankäyttösektori). Energia- ja ilmastostrategian valmistelussa korostuvat päästöjen vähentämistimet, toimivat energiamarkkinat, puhdas sähköntuotanto ja Suomen energiaturvallisuus osana kestävyysmurrosta. Myös yhteiskunnalliset ja kilpailukykyvaikutukset ovat strategian keskiössä. Suomen tavoitteena on kasvattaa ilmastokädenjälkeään ja edetä hiilineutraaliuuden vaikuttavin ja kestävin keinoin. Luvituksen sujuvuus on edellytys puhtaiden investointien syntymiselle.

Kuntien ilmastoratkaisut –ohjelma

Kuntien ilmastoratkaisut – ohjelma vauhdittaa, edistää ja rahoittaa paikallista ilmastotyötä. Ohjelma on rahoittanut tähän mennessä lähes 150 erilaista ilmastohanketta eri puolella Suomea. Ohjelma kestää vuoden 2024 loppuun saakka. Ohjelma on tuonut kuntien ja alueiden ilmastotyön kansallisen ilmastopolitiikan valmistelun ja toimeenpanon keskiöön.

MAL-sopimukset

Seitsemän suurimman kaupunkiseudun kanssa jatketaan MAL-sopimusmenettelyä, jossa vahvistetaan valtion ja kaupunkiseutujen välistä kumppanuutta maankäytön, asumisen ja liikenteen kysymyksissä. MAL-sopimuksilla edistetään vähähiilistä ja kestävästä yhdyskuntarakennetta ja liikennejärjestelmää, liikenteen digitalisaatiota sekä tarpeita vastaavaa asunonkaavoitusta ja -tuotantoa. MAL-sopimuksilla varmistetaan kaupunkiseutujen kasvun ja saavutettavuuden edellytyksiä infrastruktuuri- ja asuntotuotantoinvestoinneilla. Yhdyskuntarakennetta tiivistämällä voidaan hillitä ilmastomuutosta, vähentää kasvihuonekaasupäästöjä ja luonnonvarojen kulutusta, sekä ehkäistä hiilinielujen vähenemistä. Valtio rahoittaa MAL-sopimusten valtion osuuden.

Ekosysteemisopimukset

Ekosysteemisopimusten päätavoitteena ovat innovatiiviset ja edelläkävijyyttä tavoittelevat kaupungit, jotka vahvuksiensa pohjalta hyödyntävät digitalisaation, muiden uusien teknologioiden ja hiilineutraaliuden tuomat mahdollisuudet kestävästä kasvun aikaansaamiseksi. 16:sta sopimuskaupunkiseudusta noin viidellä (5) on sopimuksessaan suoria sisältöjä ilmastomuutosta hillitsevien ja älykkäiden ratkaisujen kehittämiseksi. Ekosysteemisopimukset ovat siten yksi tärkeä valtion väline tukea ilmastomission toteutumista erityisesti hiilikädenjäljen näkökulmasta.

Business Finland / Decarbonized cities –ohjelma

Decarbonized Cities –ohjelman tavoite on, että vuoteen 2030 mennessä maailmanlaajuisesti kymmenen kaupunkia on suomalaisosaamisen ansiosta merkittävästi vähentänyt hiilipäästöjään. Osaaminen integroiduissa järjestelmäratkaisuissa on avain tämän tavoitteen saavuttamiseksi ja vauhdittaa konkreettisesti hiilikädenjälkeä myös Suomen rajojen ulkopuolella.

Kiertotalousohjelma

Kiertotalousohjelmalla tavoitellaan luonnonvarojen kestävästä käyttöä. Kiertotalouden osaamisverkosto (Kisu) tukee kuntia ja yrityksiä muun muassa rahoitusmahdollisuuksien löytämisessä, koulutuksella sekä yhteiskehittämishankkeilla. Parhaillaan ministeriöt, tutkimuslaitokset, kunnat (20 kuntaa) ja maakunnan sekä keskeiset toimialat laativat ehdotusta vapaaehtoisesta sitoumuksesta kiertotalouden edistämiseksi. Tässä ns. green deal-prosessissa tehdään arvioita tulevaisuuden suunnista ja tavoitteista sekä kehitetään yhdessä vaikuttavampia toimia kiertotalouden edistämiseksi. Tavoitteena on koko Suomen kiertotaloussitoutus.

Energiatuet ja energiatehokkuus

Energiatuen tavoitteena on edistää uusien ja innovatiivisten ratkaisujen kehittämistä energijärjestelmän muuttamiseksi vähähiiliseksi pitkällä aikavälillä. Energiatukea voivat saada kaiken kokoiset yritykset ja yhteisöt, kuten kunnat, seurakunnat ja säätiöt. Energiatukea voidaan myöntää sellaisiin investointi- tai selvityshankkeisiin, jotka edistävät energiansäästöä tai energiantuotannon tai -käytön tehostamista. Tuen myöntää Business Finland tai TEM.

Verkostoyhteistyö kestävän ja ilmastoneutraalin kehityksen saavuttamiseksi

Valtio on käynnistänyt hiilineutraaliuden tavoitteluun verkostoja, joissa tuetaan ja annetaan verkostojen jäsenille asiantuntija-apua, tietoa ja kehittämisideoita, sekä viedään täytäntöön valtion tavoitteita ilmastoneutraalin yhteiskunnan vahvistamiseksi.

Hinku (hiilineutraalit kunnat) verkosto on ilmastomuutoksen hillinnän edelläkävijöiden verkosto, joka kokoaa yhteen kunnianhimoisiin päästövähennyksiin sitoutuneet kunnat, ilmastoyhteistyötoimintatapoja ja palveluita tarjoavat yritykset sekä energia- ja ilmastoalan asiantuntijat. Hinku-verkostossa on mukana lähes 100 kuntaa sekä viisi maakuntaa. Hinku-verkosto jakaa tietoa ilmastomuutoksen hillinnän parhaista käytännöistä, tukee kuntien ilmastotyötä sekä luo kysyntää ilmastoyhteistyötoimintatapoille ja palveluille.

Fisu (Finnish Sustainable Communities) verkosto on resurssiviisaiden edelläkävijäkaupunkien ja -kuntien verkosto, joka tavoittelee päästöttömyyttä, jätteenkäyttöä ja globaalisti kestävästä kulutuksesta. Verkoston tavoitteena on auttaa kehittämään uusia vähäpäästöisiä toimintatapoja ja ratkaisuja, jotka rakentavat kestävästä hyvinvointia ja kasvua paikallisiin vahvuuksiin perustuen.

Sitoumuksen voimassaolo ja luonne

Sitoumus on luonteeltaan yhteistyöasiakirja, jonka kautta valtio osoittaa tukensa ilmastomissio kaupunkien työlle ja tahtotilan toimia yhteistyössä ilmastokaupunkisopimuksen solmineiden kaupunkien kanssa. Se ei muodollisesti sido osapuolia esim. rahoitukseen. Sitoumusta voidaan tarvittaessa päivittää kaupunkien ilmastosopimusten päivitysten ohessa kahden vuoden välein. Tämä asiakirja toimii ilmastokaupunkisopimuksen laatineiden kaupunkien sopimusliitteenä.

Allekirjoitukset

Valtio-osapuolen puolesta sitoutuvat työ- ja elinkeinoministeriö ja ympäristöministeriö

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VN/2257/2022-TEM-10

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Consumption-based emissions, Espoo

Kulma-model, April 2023

Introduction

In order to mitigate climate change, it is still essential to replace fossil fuels with renewable forms of energy and invest in energy efficiency and energy saving. In climate work, however, attention should also be turned to emissions caused by consumption.

According to estimates presented by the Finnish Environment Institute, it would be possible to achieve a 40-70 percent reduction in emissions by changing the consumption of services and products to low carbon alternatives. Reducing emissions from consumption requires socio-cultural changes in behavior, such as switching to a more plant-based diet. However, significant changes in consumption-based emissions also require changes in infrastructure and the adoption of technology.

Municipalities play a significant role in climate work together with the state level. Municipalities have the opportunity to support their residents make climate-friendly choices, for example by investing in public transport, school meals and offering low-emission district heating. In addition, communication and information sharing are ways that municipalities can use to make an impact.



Kulma calculation model

Calculation model and model development

The Kulma calculation model for consumption-based emissions divides emissions into five sectors: energy consumption, construction, transportation, food and goods and services. The sectors are further divided into more specific sub-sectors.

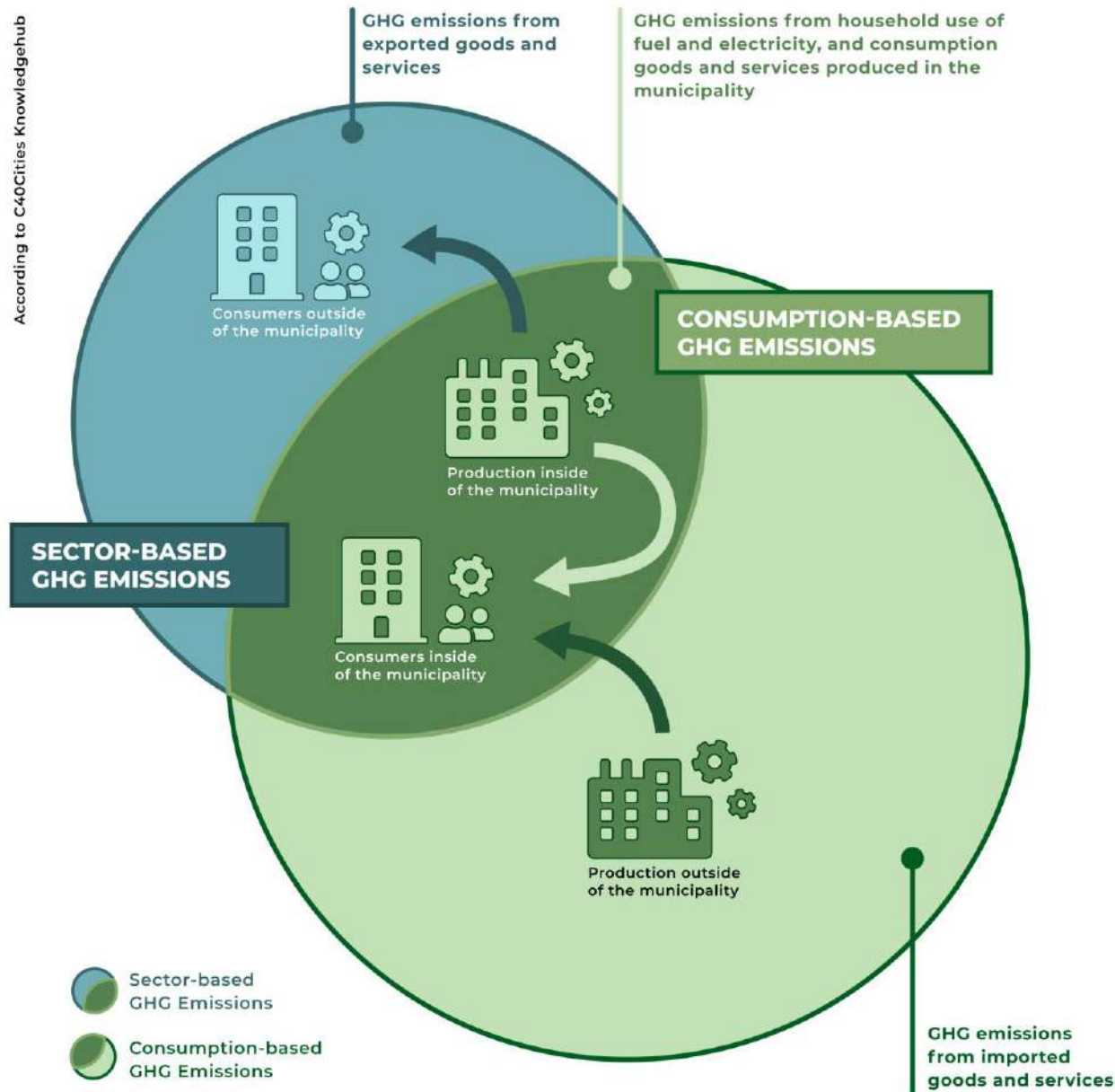
The calculation model developed in cooperation by Sitowise and Natural Resources Institute Finland is the first Finnish calculation model for consumption-based emissions, which has been comparably applied to a large number of municipalities. The calculation model was first piloted in a pilot project implemented in 2021. In the calculation round that ended in April 2023 consumption-based emissions were calculated for a total of 20 municipalities. The development of the model has been supported by a wide network of experts.

Why consumption emissions should be monitored

A broader knowledge base of greenhouse gas emissions caused by activities of the municipality and its citizens helps municipalities plan and target climate actions to reduce greenhouse gas emissions and measure the effects of implemented actions.

Citizens are a significant and very important stakeholder group when municipalities strive for carbon neutrality. However, it is often the effects of climate measures taken by citizens that are excluded from sector-based emission calculations. Consumption-based emission calculation aim to meet this challenge.

In some municipalities consumption-based greenhouse gas emissions may be significantly higher than sector-based greenhouse gas emissions. Calculating consumption-based greenhouse gas emissions therefore complements the information provided by sector-based greenhouse gas emission calculations.



Overlaps and differences between consumption-based and sector-based calculations

When talking about municipal greenhouse gas emissions, we often mean greenhouse gas emissions calculated using sector-based, regional, calculation models. Sector-based calculation models mainly cover emissions caused by energy consumption within the municipality and waste management, as well as other emissions occurring within the municipality's geographical area. For example, emissions from agriculture and product manufacturing in the municipality are included in the calculation, regardless of where the products are consumed. When calculating consumption-based greenhouse gas emissions, the calculation includes all emissions caused by the consumption of citizens, regardless of where the consumed goods were produced. For example, emissions from food and goods consumed by citizens are included in the calculation, even if the production of the products takes place outside the municipality's or Finland's borders.

Figure 1: Sector-based and consumption-based emission calculations partially overlap. They are not alternatives to each other but complement each other and together provide a broader knowledge base of greenhouse gas emissions caused by activities of the municipality and its citizens.

Table 1: Consumption-based emissions in total (kt CO₂ eq) by sector in 2020 and 2022.

Greenhouse gas emissions from consumption, kt CO ₂ eq	2020	2022
Energy consumption	722,3	559,8
Electricity consumption	164,8	165,6
District heating	475,7	307,7
Oil, natural gas and wood heating	65,6	70,6
Cottage living (electricity consumption and wood burning)	16,1	15,9
Construction	170,6	459,5
New buildings	161,3	428,4
Streets and roads	8,2	30,4
Bridges	1,1	0,7
<i>Carbon handprint of construction (positive climate impact achieved by choices of building materials)</i>	-100,1	-212,4
Transportation	462,6	479,9
Passenger car traffic	189,4	185,2
Aviation, international	239,3	242,8
Aviation, national		13,9
Waterborne navigation, international	34,0	34,5
Waterborne navigation, pleasure boats		3,5
Food	564,8	569,7
Goods and services	649,3	625,0
Private sector consumption	550,7	549,0
Public sector consumption	98,6	76,0
Total	2 569,6	2 693,9

Table 2: Consumption-based emissions per capita (t CO₂ eq/capita) by sector in 2020 and 2022.

Greenhouse gas emissions from consumption, t CO ₂ eq/capita	2020	2022
Energy consumption	2,47	1,88
Electricity consumption	0,56	0,56
District heating	1,62	1,04
Oil, natural gas and wood heating	0,22	0,24
Cottage living (electricity consumption and wood burning)	0,06	0,05
Construction	0,58	1,55
New buildings	0,55	1,44
Streets and roads	0,03	0,10
Bridges	0,00	0,00
<i>Carbon handprint of construction (positive climate impact achieved by choices of building materials)</i>	-0,34	-0,71
Transportation	1,58	1,62
Passenger car traffic	0,65	0,62
Aviation, international	0,82	0,82
Aviation, national		0,05
Waterborne navigation, international	0,12	0,12
Waterborne navigation, pleasure boats		0,01
Food	1,93	1,92
Goods and services	2,22	2,10
Private sector consumption	1,88	1,85
Public sector consumption	0,34	0,26
Total	8,78	9,07

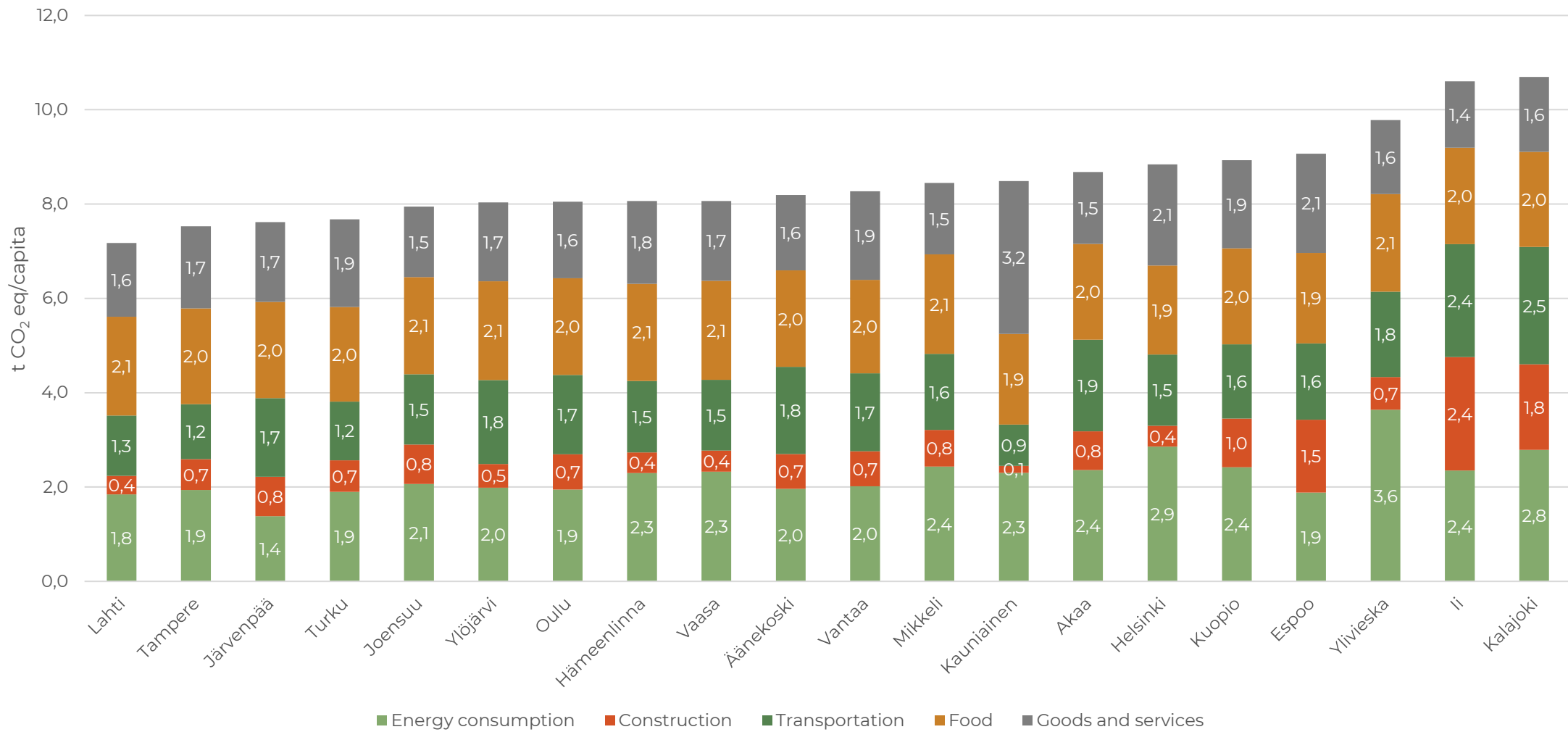


Figure 2: Consumption-based emissions of Espoo and other Kulma-municipalities in year 2022 (t CO₂ eq/capita). The carbon handprint effect of construction is not shown in the picture.

SITOWISE


Luke
LUONNONVARAKESKUS





SITOWISE



ILMASTOTIEKARTAN SKENAARIOTYÖ

HIILINEUTRAALI ESPOO 2030-TIEKARTTA

PÄIVITYSTYÖ: LISÄTOIMENPITEET, SYYSKUU 2023

Vipuvoimaa
EU:lta
2014–2020



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TAUSTAA

Espoon tavoitteena on olla hiilineutraali vuoteen 2030 mennessä. Hiilineutraaliudella tarkoitetaan sitä, että kaupungin alueella syntyy vuoden aikana vain sen verran kasvihuonekaasupäästöjä kuin niitä pystytään sitomaan. Hiilineutraaliustavoite Espoossa tarkoittaa, että kasvihuonekaasupäästöjä vähennetään 80 prosenttia vuoden 1990 tasosta vuoteen 2030 mennessä ja jäljelle jäävä 20 prosenttia sidotaan hiilinieluihin tai kompensoidaan muilla keinoilla.

Ilmastotyönsä tueksi kaupunki kokoaa Hiilineutraali Espoo 2030-tiekarttaa, joka kuvaa kaupungin oman sekä kumppaneiden ja asukkaiden kanssa tehtävän yhteistyön hiilineutraaliustavoitteen saavuttamiseksi. Tiekartta pohjautuu Kestävän energian ja ilmaston toimintasuunnitelmaan (Sustainable Energy & Climate Action Plan, SECAP) ja Kestävä Espoo -ohjelmaan.

Tiekartassa otetaan lisäksi huomioon Espoon osallistuminen EU:n komission 100 hiilineutraalia ja älykästä kaupunkia 2030 mennessä -missioon. Mukaan valitut kaupungit toimivat kokeilu- ja innovaatiokeskuksina ratkaisuille, joiden avulla kaikki Euroopan kaupungit voivat saavuttaa samat tavoitteet vuoteen 2050 mennessä.



SKENAARIOLASKENNAT JA OLETUKSET



SITOWISE



ESPOO
ESBO

YLEISTÄ

Osana Hiilineutraali Espoo 2030-tiekarttatyötä kaupungin päästökehitystä arvioitiin kolmessa skenaariossa.

Pessimistinen skenaario, jossa oletetaan, että uusia päästövähennystoimia ei kaupungissa suunnitella tai toteuteta. Skenaariossa kaupungin päästökehitykseen vaikuttaa esimerkiksi kaupungin kasvava asukasmäärä.

Suomi 2035-skenaario, jossa oletetaan, että kansallisella tasolla toteutettavat ilmastopolitiikan toimet ja linjaukset vaikuttavat Espoon päästökehitykseen. Kaupungin kasvu ja EU:n lainsäädännön vaikutukset otetaan niin ikään skenaariossa huomioon.

Hiilineutraali Espoo 2030-skenaario (HNE2030), jossa oletetaan, että kaupungin päästökehitykseen vaikuttavat kansallisten toimien lisäksi myös kaupungin ja sen yhteistyökumppaneiden, kuten Fortumin ja HSY:n, toteuttamat ilmastotoimet.

Skenaariolaskentojen oletukset on kuvattu seuraavilla kalvoilla. Laskentojen pohjana on hyödynnetty HSY:n tuottamia päästölaskentatietoja [1] ja niiden taustalla käytettyjä energiankulutuksen tietoja [2]. HSY:n tiedot olivat skenaariolaskentojen aikaan saatavilla vuoteen 2021 saakka.

Kaupungin päästökehitys on kunkin skenaarion osalta arvioitu vuosille 2025, 2030 ja 2035.

Skenaariolaskentojen tulokset esitetään osana Kausal Oy:n Espoon kaupungille tuottamaa ilmastovahti-palvelua (<https://ilmastovahti.espoo.fi/>). Skenaariolaskentojen toteutuksesta on vastannut Sitowise Oy.

SITOWISE



MENETELMÄ

Laadittava Hiilineutraali Espoo tiekartta 2030 pohjautuu Kestävän energian ja ilmaston toimintasuunnitelmaan (Sustainable Energy & Climate Action Plan, SECAP) ja Kestävä Espoo -ohjelmaan. Kaupungin kasvihuonekaasupäästöjen kehitystä on edellisen kerran arvioitu vuonna 2018 laaditun Kestävän energian ja ilmaston toimintasuunnitelman yhteydessä.

Skenaariolaskentojen yhteydessä tuolloin tehdyt oletukset päästöjen kehityksestä on päivitetty. Esimerkiksi kaupungin väkiluvun kasvu on ollut vuoden 2018 arviota nopeampaa. Päivitetyt skenaariolaskennat eroavat toisistaan lisäksi käytetyn menetelmän osalta. Edelliset, vuonna 2018 lasketut skenaariot on tehty SECAP-menetelmään pohjautuen. Menetelmän sektorijako eroaa HSY:n käyttämästä sektorijaosta ja lisäksi teollisuus ja maatalous ovat SECAP-laskennan ulkopuolella. Lisäksi sähkön päästökertoimen laskenta eroaa menetelmissä toisistaan. HSY:n laskennassa käytössä on Suomen keskimääräinen sähkön päästökerroin, kun taas SECAP-laskennassa sähkölle hyödynnetään päästökerrointa, johon kansallisen päästökertoimen lisäksi vaikuttaa myös kaupungin alueella tapahtuva sähköntuotanto ja siitä aiheutuvat päästöt. Menetelmäeroista johtuen päästökehitys on HSY:n ja SECAP:n menetelmillä laskettuna erilainen, eivätkä skenaariolaskennat ja niiden tuloksetkaan ole suoraan verrattavissa toisiinsa.

Espeen SECAP-menetelmän mukaiset kasvihuonekaasupäästöt vuodelta 2020 laskettiin osana skenaariotyötä.

Syyskuussa 2023 päättyneessä päivitystyössä skenaariolaskentoja täydennettiin lisätoimenpiteiden arvioinnilla.



VÄKILUKU

Espoon väkiluku oli vuoden 2021 lopussa 297 132 asukasta ja 300 505 asukasta vuonna 2022 . Kaupungin on arvioitu kasvavan myös tulevina vuosina. Skenaariolaskennoissa väestön on oletettu kaikissa skenaarioissa kehittyvän kaupungin tuoreen pitkän väestöennusteen perusvaihtoehdon [3] mukaisesti, jossa väkiluvun oletetaan kehittyvän seuraavasti:

2021: 297 132 asukasta
2022: 300 505 asukasta
2023: 306 628 asukasta
2024: 311 404 asukasta
2025: 316 189 asukasta
2026: 320 968 asukasta
2027: 325 734 asukasta
2028: 330 474 asukasta
2029: 335 184 asukasta
2030: 339 856 asukasta
2031: 344 488 asukasta
2032: 349 084 asukasta
2033: 353 647 asukasta
2034: 358 180 asukasta
2035: 362 690 asukasta



KULUTUSSÄHKÖ

Kulutussähköön sisältyy muu kuin lämmitykseen (sähkölämmitys ja maalämpö) käytetty sähkö. Kulutussähköön sisältyvät siis myös julkisten toimijoiden ja yritysten, kuten Fortumin sähkönkulutus. Fortumin tuotannon sähköistyminen vaikuttaa siis arvioon kulutussähkön kehityksestä. Kulutussähköön sisältyy lisäksi HSY:n menetelmän mukaisesti sähköisten ajoneuvojen lataukseen käytetty sähkö. Liikenteen sähköistymisen vaikutukset näkyvät siis niin ikään kulutussähkön kehityksessä. Liikennesähkön erottaminen laskennasta on tulevaisuuden tavoite, mutta saatavilla olevan nykytiedon valossa sitä ei ole vielä mahdollista tehdä.

Kulutussähkön päästökehitystä arvioitaessa kehitykseen vaikuttavia tekijöitä ovat sähkönkulutuksen kehitys sekä sähkön päästökertoimen kehitys. Sähkön päästökertoimen kehitykseen vaikuttavat sähkön tuotantotavat. HSY:n päästölaskennassa sähkönkulutuksen päästökertoimenä käytetään valtakunnallista päästökerrointa, johon vaikuttavat siis kaikkialla Suomessa tehdyt sähköntuotannon päästöjä vähentävät toimet, kuten esimerkiksi tuulisähkön ja aurinkosähkön tuotantomäärien kasvattaminen. HSY:n päästölaskennassa käytetty päästökeroon kulutussähkölle oli 169,7 t CO₂-ekv/GWh vuonna 1990 ja 79,2 t CO₂-ekv/GWh vuonna 2021.

Skenaariolaskennoissa kulutussähkön päästöihin vaikuttavien muuttujien on oletettu kehittyvän seuraavasti:

Pessimistisessä skenaariossa asukaskohtaisen sähkönkulutuksen on oletettu kehittyvän vuosina 2017-2021 toteutuneen trendin mukaisesti (-0,4 prosenttia per asukas per vuosi). Skenaariossa oletetaan, että kehitys jatkuu viimeisten vuosien mukaisena myös aikavälillä 2021-2035. Espoon väkiluvun kasvaessa sähkön kokonaiskulutus kasvaa vaikka asukaskohtainen kulutus hieman laskeekin. Kokonaiskulutuksen kasvu on kuitenkin muita skenaarioita maltillisempaa, sillä Fortumin tuotannon tai liikenteen ei oleteta sähköistyvän yhtä nopeasti kuin muissa skenaarioissa.

Kulutussähkön päästökertoimen oletetaan pessimistisessä skenaariossa pysyvän vuoden 2021 tasolla (79,2 t CO₂-ekv/GWh).

Suomi 2035-skenaariossa asukaskohtaisen sähkönkulutuksen oletetaan pysyvän vuoden 2021 tasolla. HSY:n laskelmien perusteella espoolaiset kuluttivat sähköä 5,8 MWh/asukas vuonna 2021. Energiatieteiden tutkimuskeskuksen oletetaan skenaariossa hillitsevän kokonaiskulutuksen kasvua mutta kasvu on kuitenkin pessimististä skenaariota nopeampaa, sillä Fortumin tuotannon, liikenteen ja teollisuuden oletetaan skenaariossa sähköistyvän pessimististä skenaariota nopeammin. Kokonaiskulutuksen kehitykseen vaikuttaa muiden skenaarioiden tapaan kaupungin väkiluvun kasvu.

Sähkön päästökertoimen oletetaan Suomi 2035-skenaariossa kehittyvän Energiatieteiden tutkimuskeskuksen vähähiilisyystiekartan taustaselvityksen [4] vähähiiliskenaarion arvion mukaisesti seuraavasti:

2025: 59,4 t CO₂-ekv/GWh

2030: 34,7 t CO₂-ekv/GWh

2035: 10,0 t CO₂-ekv/GWh

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) sähkönkulutuksen oletetaan Espoossa kasvavan 3,4 prosenttia vuodessa sähkönjakeluyhtiö Carunan arvion mukaisesti [5]. Sähkönkulutuksen kasvu perustuu yhtiön arvioon asiakasmäärän kasvusta sekä liikenteen, lämmityksen ja teollisuuden sähköistymisestä. Sähkönkulutuksen kasvuun vaikuttavia merkittäviä tekijöitä ovat lisäksi Fortumin kaukolämmöntuotannon sähköistyminen sekä tulevaisuuden investoinnit Espoon alueella, esimerkiksi datakeskuksiin. Arvioissa on otettu huomioon energiategokkuustoimien vaikutukset sekä esimerkiksi lisääntyvän aurinkovoiman pientuotannon yleistymisen, jotka osaltaan hillitsevät kulutuksen kasvua.

Sähkön päästökertoimen oletetaan skenaariossa kehittyvän kuten Suomi 2035-skenaariossa.

RAKENNUSTEN LÄMMITYS – KERROSALA

Rakennusten lämmityksestä aiheutuu merkittävä osa Espoon päästöistä. Vuonna 1990 rakennusten lämmityksen osuus kokonaispäästöistä oli 43 prosenttia. Vastaava osuus vuonna 2021 oli 45 prosenttia.

Rakennusten lämmityksen päästöjä arvioitaessa vaikuttavia tekijöitä ovat oletukset muutoksista kerrosalassa, lämmitystapajakaumassa, lämmitysenergian tarpeessa sekä sähkön ja kaukolämmön päästökertoimissa tapahtuvissa muutoksista. Espoossa kaukolämmön toimittajana toimii Fortum. Fortumin asiantuntijoiden näkemyksiä on hyödynnetty kaukolämmön tuotannon ja päästökehityksen arvioinnissa.

Nykytilassa rakennusten kerrosalan on oletettu vastaavan HSY:n laskentojensa taustalla käyttämää tietoa sähkö- ja öljylämmitettyjen kiinteistöjen kerrosalasta [6] sekä kaukolämmön piirissä olevien rakennusten osalta Tilastokeskuksen rakennuskantatilaston [7] mukaista jakaumaa rakennusten käyttötarkoituksen ja lämmitysaineen osalta. Rakennusten kerrosalan muutosta arvioitaessa on skenaarioissa käytetty seuraavia oletuksia:

Pessimistisessä skenaariossa rakennuskannan kerrosalassa tapahtuvat muutokset eivät vaikuta oletettuun päästökehitykseen vaan laskenta perustuu asukaskohtaisten päästöjen kehitykseen ja toteutuneeseen trendiin aikavälillä 2017-2021 sekä väkiluvun kehitykseen.

Suomi 2035-skenaariossa asumisväljyyden on oletettu pysyvän muuttumattomana aikavälillä 2021-2035. Oletus perustuu Espoon asunto-ohjelmassa esitettyihin tietoihin [8], joiden perusteella asumisväljyys Espoossa on pysynyt viime vuosina muuttumattomana. Asuinrakennusten kerrosalan kehitykseen vaikuttaa väkiluvun kasvu.

Muiden kuin asuinrakennusten osalta kerrosalan arvioidaan kehittyvän Uudenmaan kasvun vaihtoehdot-selvityksen [9] mukaista toimitilojen muutosennustetta noudattaen. Ennusteen perusteella liiketilojen kerrosalat kasvavat 0,7 prosenttia vuodessa, ja teollisuus ja liikennerakennukset 0,5 prosenttia vuodessa. Julkisten palveluiden rakennusten pinta-alan/asukas oletetaan pysyvän samalla tasolla kuin vuonna 2021. Toimistorakennuskannan kerrosalan oletetaan säilyvän ennallaan, eikä kasvuja odoteta tapahtuvan.

Laskennassa oletetaan, että vanha rakennuskanta säilyy aikavälillä 2021-2035 ja uudisrakennukset vastaavat rakennuskannan lisäystä.

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) rakennusten kerrosalan oletetaan kehittyvän kuten Suomi 2035-skenaariossa.

RAKENNUSTEN LÄMMITYS – LÄMMITYSENERGIA

Rakennusten lämmitys jakautuu edelleen kaukolämmitykseen, sähkölämmitykseen ja öljylämmitykseen. Kunkin lämmitysmuodon päästöihin vaikuttaa lämmitykseen käytetyn energian määrä. Ilmaston lämpenemisen arvioidaan vähentävän lämmitystarvetta tulevaisuudessa jonkin verran mutta merkittävämpi vaikutus on erilaisilla energiatehokkuutta parantavilla toimilla.

Pessimistisessä skenaariossa rakennusten lämmityksen energiankulutuksen oletetaan kaikkien lämmitysmuotojen osalta kehittyvän viimeisen viiden vuoden aikana (2017-2021) toteutuneen trendin mukaisesti.

Suomi 2035-skenaariossa rakennusten ominaislämmönkulutuksen oletetaan kaikkien lämmitysmuotojen osalta kehittyvän Suomen ympäristökeskuksen arvion [10] mukaisesti asuinrakennuksissa niin, että lämmönkulutus laskee 7,5 prosenttia vuoden 2021 tasosta vuoteen 2030 mennessä ja muissa rakennuksissa 11 prosenttia erilaisten energiatehokkuutta edistävien toimien myötä. Energiatehokkuuden kehityksen oletetaan jatkuvan samankaltaisena aikavälillä 2030-2035.

Keskkipitkän aikavälin ilmastopolitiikan suunnitelman (Kaisu2) [11] mukaisesti öljylämmityksestä oletetaan luovuttavan 95-prosenttisesti vuoteen 2030 mennessä, ja luovuttavan kokonaan vuoteen 2035 mennessä. Pien- ja rivitalojen oletetaan lämmitystapamuutosten yhteydessä siirtyvän 100-prosenttisesti lämpöpumppuihin. Kerrostaloissa, palvelurakennuksissa ja teollisuusrakennuksissa oletetaan siirryttävän 50-prosenttisesti lämpöpumppuihin ja 50-prosenttisesti kaukolämpöön.

Olemassa olevan rakennuskannan osalta ei oleteta muita lämmitystapamuutoksia.

Uudisrakennukset oletetaan rakennettavan rakennusmääräysten energiatehokkuustavoitteiden [10] mukaisesti. Tämän perusteella pientalojen ominaislämmönkulutuksen arvioidaan olevan 115 kWh/m², rivitalojen 109 kWh/m², asuinkerrostalojen 66 kWh/m² ja muiden rakennusten 82 kWh/m².

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) rakennusten ominaislämmityksen kulutuksen oletetaan kehittyvän kuten Suomi 2035 – skenaariossa.

Palvelurakennusten osalta oletetaan, että öljylämmityksestä luovutaan 100-prosenttisesti vuoteen 2030 mennessä kaupungin ilmastotoimien tavoitteiden mukaisesti. Muiden rakennusten osalta oletetaan Suomi 2035-skenaariota mukainen kehitys.

Uudisrakennusten ominaislämmönkulutuksen oletetaan kehittyvän PITKO-selvityksen [12] Jatkuva kasvu –skenaariota mukaisesti. Tämän perusteella pientalojen ominaislämmönkulutuksen arvioidaan olevan 66 kWh/m², rivitalojen 57 kWh/m², asuinkerrostalojen 57 kWh/m² ja muiden rakennusten 52 kWh/m².

Kaukolämmön tuotannon ja kulutuksen oletetaan Fortumin arvion [13] mukaisesti pysyvän nykytasolla, eli noin 2100 GWh vuodessa.

RAKENNUSTEN LÄMMITYS – PÄÄSTÖKERTOIMET

Rakennusten lämmityksen päästöihin vaikuttavat merkittävästi sähkön päästökertoimen sekä kaukolämmön päästökertoimen kehitys. Näiden on arvioitu kehittyvän eri skenaarioissa alla esitetyn mukaisesti.

Pessimistisessä skenaariossa Kaukolämmön päästökertoimen oletetaan pysyvän vuoden 2021 tasolla (122,0 t CO₂-ekv/GWh).

Lämmityssähkön päästökertoimenä käytetään kulutussähkön mukaista vuoden 2021 kerrointa (79,2 t CO₂-ekv/GWh).

Lämmitysöljyn päästökertoimen oletetaan pysyvän vuoden 2021 tasolla.

Suomi 2035-skenaariossa kaukolämmön päästökertoimen oletetaan kehittyvän Energiateollisuuden vähähiilisyystiekartan taustaselvityksen [4] vähähiiliskenaarion arvion mukaisesti:

2025: 96,9 t CO₂-ekv/GWh

2030: 65,4 t CO₂-ekv/GWh

2035: 34,0 t CO₂-ekv/GWh

Lämmityssähkön päästökertoimeksi oletetaan vastaavan kulutussähkön kerrointa vuosina 2025, 2030 ja 2035. Oletus kulutussähkön ja lämmityssähkön päästökertoimien kehityksestä samankaltaiseksi tulevaisuudessa perustuu sähköjärjestelmän muutokseen ja HSY:n asiantuntijoiden arvioon.

Biopolttoöljyn jakeluveloitteen ja kestävyyslain muutoksen [14] oletetaan vaikuttavan lämmitysöljyn päästökertoimeen. Tämän myötä lämmitysöljyn päästökertoimen oletetaan laskevan noin 9,7 prosenttia vuoteen 2028 mennessä.

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) kaukolämmön päästökertoimen oletetaan kehittyvän Fortumin arvion [13] mukaisesti:

2025: 40,0 t CO₂-ekv/GWh

2030: 6,0 t CO₂-ekv/GWh

2035: 6,0 t CO₂-ekv/GWh

Espoon kaukolämmön muutosmatka vuoteen 2029 on kuvattu seuraavalla kalvolla.

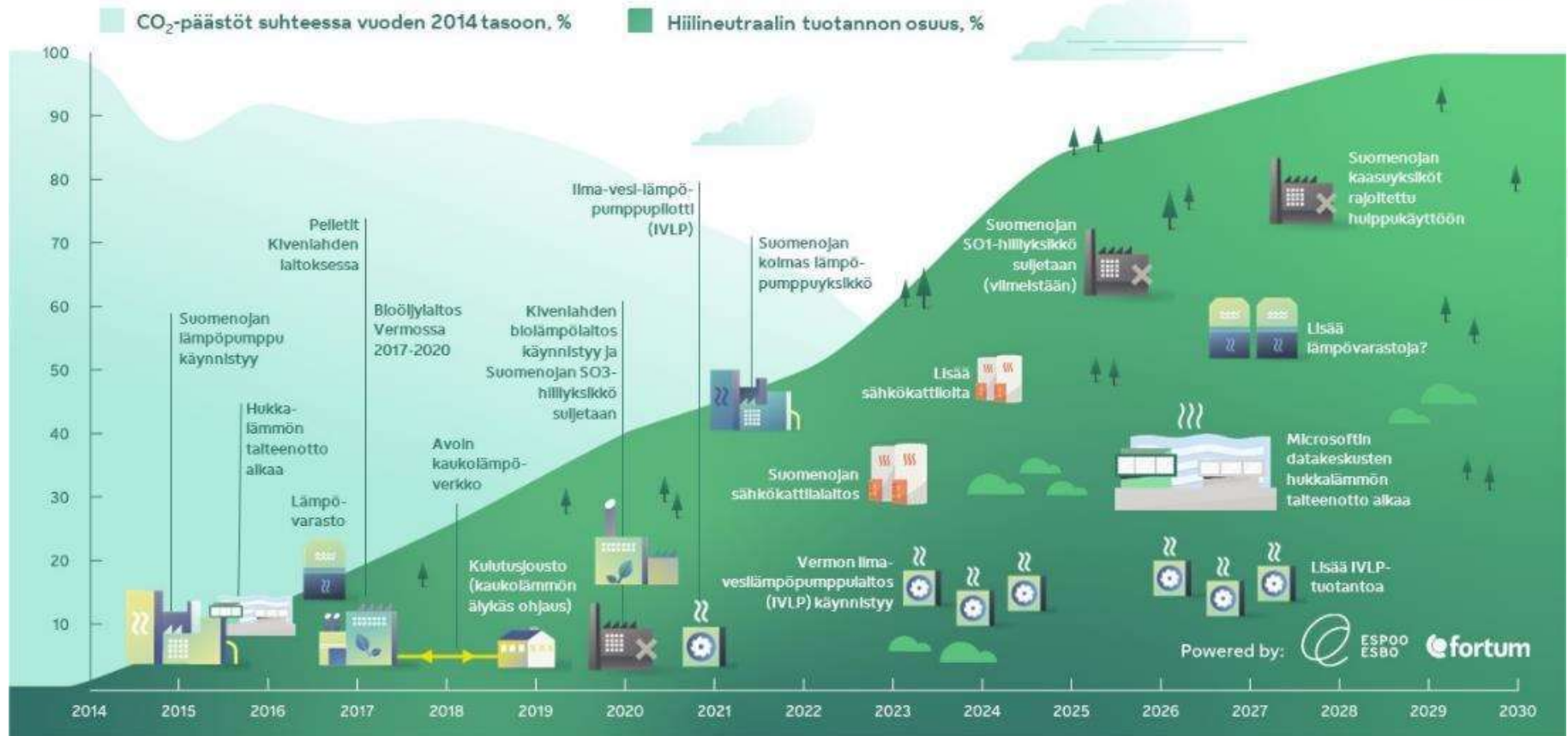
Lämmityssähkön päästökertoimen oletetaan kehittyvän kuten Suomi 2035-skenaariossa.

Lämmitysöljyn päästökertoimen oletetaan kehittyvän kuten Suomi 2035-skenaariossa.

Espoon kaukolämmön muutosmatka 2014–2029

Havainnekuva

Espoo
Clean
Heat



Espoon kaukolämmön muutosmatka 2014-2029. Lähde: Fortum, Media Bank (Viitattu 1/2023).

LIIKENNE

Rakennusten lämmityksen ohella liikennesektori on Espoossa merkittävin päästöjä aiheuttava sektori. Vuonna 1990 liikenteen osuus kokonaispäästöistä oli 27 prosenttia ja vuonna 2021 osuus oli 35 prosenttia. Tulevaisuudessa liikenteen osuuden päästöistä voidaan olettaa kasvavan edelleen, sillä muun muassa rakennusten lämmityksen ja sähkönkulutuksen päästöt laskevat.

Espoossa liikenteen päästöt ovat käytännössä kokonaan tieliikenteen aiheuttamia. Raideliikenne on sähköistetty ja sitä käsitellään liikennesektorilla nollapäästöisenä päällekkäisen laskennan välttämiseksi. VTT:n LIPASTO-järjestelmän tietojen perusteella tieliikenteen päästöistä 59 prosenttia aiheutui vuonna 2021 henkilöautoliikenteestä, 9 prosenttia pakettiautoliikenteestä, 25 prosenttia kuorma-autoliikenteestä ja 6 prosenttia linja-autoliikenteestä [15].

Liikenteen päästöjen kehitystä arvioitaessa vaikuttavat muuttujat ovat **tieliikenteen suoritteiden kehittyminen** sekä **autokannan keskimääräisten yksikköpäästöjen kehittyminen**. Yksikköpäästöjen kehittymiseen vaikuttavat merkittävästi biopolttoaineiden osuus sekä autokannan sähköistyminen ja luontainen uudistuminen.

Skenaariolaskennat on laadittu arvioimalla Espoon autokannan yksikköpäästökerrointen kehitystä kansallisen perusennusteen (2021) sekä HSL:lle tehtyyn tarkennuksen perustuen. HELMET-liikennemallin avulla taas on arvioitu tieliikenteen suoritteiden kehittymistä. Skenaariot ovat syntyneet näiden arvioiden tuloina.

Yksikköpäästöjen kehittyminen

Valtakunnallisen perusennusteen mukaan tieliikenteen yksikköpäästöt laskevat 32 prosenttia vuoteen 2030 ja 44 prosenttia vuoteen 2035 mennessä vuoden 2021 tasosta.

Biopolttoaineiden sekoiteosuus on vuonna 2029 ja sen jälkeen nykyisen lainsäädännön mukaisesti 30 prosenttia, kun se vuonna 2021 oli noin 18 prosenttia. Tämä vähentää päästöjä noin 16 prosenttia vuoteen 2030 ja noin 11 prosenttia vuoteen 2035 mennessä verrattuna vuoden 2021 tilanteeseen. Toimenpiteen vaikutus vähenee, koska polttomoottoriautojen määrä autokannassa vähenee.

Autokannan sähköistyminen, erityisesti henkilöautojen osalta, vähentää liikenteen päästöjä. Kansallisen perusennusteen mukaan sähkön osuus tieliikenteen energiankulutuksesta on vuonna 2030 noin 6 prosenttia ja vuonna 2035 noin 11 prosenttia.

Myös **autokannan luontainen uudistuminen ja teknologinen kehitys** vähentävät liikenteen päästöjä. Vuosittain noin 4-5 prosenttia autokannasta uusiutuu ja autokannasta poistuu vanhoja, suurempipäästöisiä autoja. Uudet fossiilisia polttoaineita käyttävät autot ovat myös jatkuvasti edeltäjiään vähempipäästöisiä mm. teknologisen kehityksen myötä. Erityisesti raskaaseen kalustoon kohdistetaan 2020-luvulla EU-tasolla sääntelyä, mikä parantaa niiden energiatehokkuutta merkittävästi. Vuoteen 2030 mennessä noin 18 prosenttia ennustetusta päästövähennyksestä vuoden 2021 tasoon verrattuna johtuu autokannan luontaisesta uudistumisesta ja teknologisesta kehityksestä ja vuoteen 2035 mennessä noin 27 prosenttia.

LIIKENNE – YKSIKÖPÄÄSTÖT

Espoossa autokannan uudistuminen on hieman maan keskiarvoa nopeampaa. Sitowise arvioi syksyllä 2021 kansallisen perusennusteen (2021) pohjalta HSL-alueen yksikköpäästökertoimien kehittymistä vuodesta 2020 vuoteen 2030. Arvion perusteella yksikköpäästöt vähenevät:

- Henkilöautoliikenteellä -35 prosenttia, lähtötilanne (2020) -5 prosenttiyksikköä alhaisempi
- Pakettiautoliikenteellä -48 prosenttia, lähtötilanne (2020) -4 prosenttiyksikköä alhaisempi
- Kuorma-autoliikenteellä -39 prosenttia. Kuorma-autoliikenteen osalta ei tehty eroja valtakunnalliseen keskiarvoon, sillä kuorma-autoliikenne liikkuu myös pitkiä matkoja ja autojen rekisteröintikunnat kertovat parhaiten pääkonttorin sijainnista, eivätkä liikennöintialueesta.

- Linja-autoliikenteen osalta työssä arvioitiin erikseen paikallisliikenteen (HSL-liikenteen) yksikköpäästökerroin sekä muun linja-autoliikenteen kerroin.
 - HSL-liikenteellä yksikköpäästöt laskevat -74 prosenttia, kun kalusto noudattaa puhtaiden ajoneuvojen direktiivin mukaisia määräyksiä. Jos kalusto on 100 prosenttisesti sähköistä, yksikköpäästöt laskevat -100 prosenttia. Jos kalusto on 90 prosenttisesti sähköistä, yksikköpäästöt laskevat noin -94 prosenttia. HSL-liikenteen osuus on arvion mukaan noin 52 prosenttia kaikesta seudun linja-autoliikenteestä. Tässä laskennassa käytettiin oletuksena 90 prosenttisesti sähköistä kalustoa (-94 prosentin päästövähennelmä).
 - Muun linja-autoliikenteen yksikköpäästöt laskevat -35 prosenttia. Laskennassa ei tehty eroa valtakunnalliseen keskiarvoon (riittäviä lähtötietoja ei käytössä, minkä lisäksi vaikutus kokonaispäästöihin hyvin pieni).

LIIKENNE – YKSIKÖPÄÄSTÖT

Yksikköpäästöjen lisätoimet, fossiilittoman liikenteen tiekartta

Fossiilittoman liikenteen tiekartassa on tunnistettu keinoja liikenteen päästöjen vähentämiseksi. Samat toimet on huomioitu myös KAISU2:ssa [11]. Seuraavaksi on eritelty tieliikenteen suoritteeseen sekä yksikköpäästöihin vaikuttavat toimenpiteet. Tunnistetut toimenpiteet ovat täysin valtion toteuttamia toimenpiteitä.

Toimenpidekokonaisuus, yksikköpäästöt	Vaikutus 2030
Fossiilisten polttoaineiden korvaaminen	-0,9 %
Autokannan nopeampi uudistuminen	-0,9 %
Henkilö- ja pakettiautojen sitovat päästöraajat	-0,7 %
Jakeluvälvoitteen nosto	-3,4 %

Fossiilisten polttoaineiden korvaaminen sisältää mm. lataus- ja jakeluinfrastruktuurin tukien korottamista sekä niiden rakentamisen velvoittamista.

Autokannan nopeampi uudistuminen sisältää mm. hankinta- ja konversiotukien jatkamisen. Romutuspalkkiokampanjoita sekä uusia hankintatukia.

Henkilö- ja pakettiautojen sitovat päästöraajat ovat EU-tason toimenpide, jolla kiristettäisiin uusien autojen päästörajoja.



LIIKENNE – YKSIKÖPÄÄSTÖT

Nykyisen lainsäädännön mukaan biopolttoaineiden jakeluelvoite nousee 30 prosenttiin vuonna 2029. Lisätoimenpiteenä jakeluelvoitetta nostettaisiin 34 prosenttiin, minkä lisäksi se ulotettaisiin koskemaan myös maa- ja biokaasua.

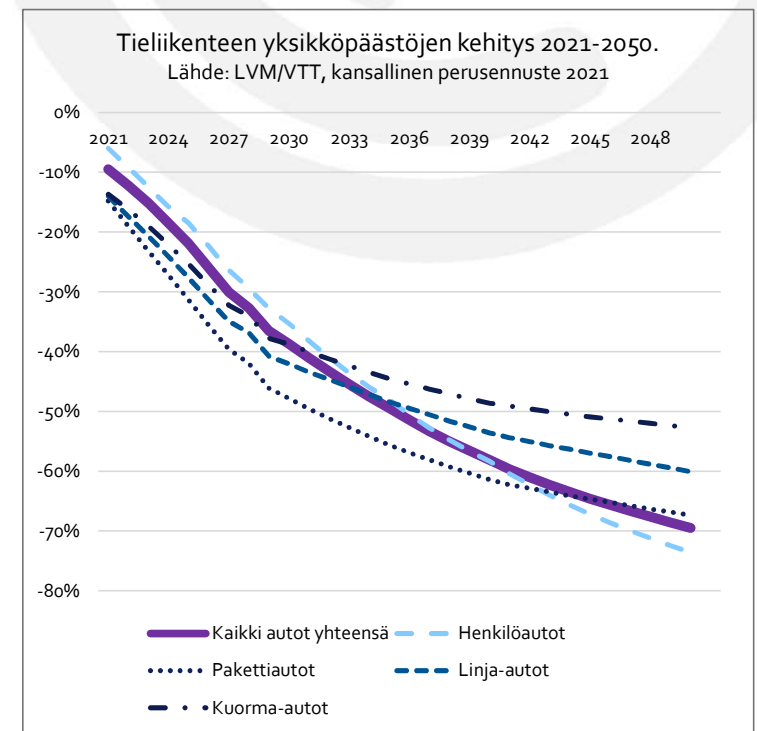
Yksikköpäästöjen lisätoimet, Espoon ilmastoavahi

Espoon ilmastoavahdin neljästä liikenteen kokonaisuudesta yksi (2.4) on autoliikenteen päästöjen vähentäminen, johon sisältyvät toimenpiteet ovat sähköautojen latausinfraan kehittäminen kaupungissa ja Espoon Asuntojen kiinteistöissä, kaupallisten liikenteen latausratkaisuiden kehittäminen, pysäköinnin tehostaminen, päästöttömien polttoaineiden jakeluinfran kehittäminen, sähköautoilun edistäminen asukkaiden ja taloyhtiöiden kautta sekä tavaraliikenteen tehostaminen. Toimenpiteet ovat hyviä, joskin osittain niitä on toteutettava myös autokannan uudistumisen myötä. Myös olemassa oleva lainsäädäntö velvoittaa mm. kiinteistöjen sähköautojen latauspisteiden rakentamiseen. Tästä johtuen niille ei ole arvioitu erillistä lisävähennystä vaan näiden toimenpiteiden oletetaan sisältyvän HSL-alueelle tehtyyn ennusteeseen. Lisäksi joukkoliikenteen sujuvoittaminen sisältää sähköbussien määrän lisääminen, mikä niin ikään on otettu huomioon skenaarioissa käytetyissä yksikköpäästökertoimissa.

Lisätoimet skenaarioissa

Lisätoimenpiteet on otettu huomioon skenaarioissa seuraavasti:

- Pessimistinen skenaario: Ei lisätoimenpiteitä
- Suomi 2035-skenaario: Kaikki fossiilittoman liikenteen tiekartan lisätoimenpiteet on toteutettu.
- Hiilineutraali Espoo 2030-skenaario (HNE2030): Kaikki fossiilittoman liikenteen tiekartan lisätoimenpiteet on toteutettu (Espoon ilmastoavahdin toimenpiteiden vaikutukset sisältyvät käytettyihin yksikköpäästökertoimiin).



Kansallisen perusennusteen (LVM/VTT, 2021) mukaiset liikenteen yksikköpäästökertoimien mukaiset vähennämät.

LIIKENNE – SUORITTEEN KEHITTÄMINEN

Tieliikenteen suoritteiden kehittäminen

Tieliikenteen suoritteiden kehittämistä Espoossa on arvioitu HELMET-mallin avulla. Mallin avulla arvioitiin liikennemääriä ajoneuvoluokittain vuosille 2030 ja 2040. Espoon osalta liikenneverkossa olivat mukana seuraavat keskeiset hankkeet: länsimetron jatke Kivenlahteen ja liityntälinjastot, Raide-Jokeri, Kuurinniityn joukkoliikennekatu, runkolinjat 520 ja 530 sekä Espoon kaupunkirata. Lisäksi vuodelle 2040 tehtiin arvio, jossa oli mukana liikenteen hinnoittelun toimenpiteitä. Arviota hinnoittelun toimenpiteistä ei kuitenkaan lopulta hyödynnetty skenaariolaskennassa. Vuoden 2035 tiedot on laskettu mallinnuksen 2030 ja 2040 keskiarvona.

Suoritteiden kasvu-% nykytilanteeseen nähden

	Henkilö- autot	Paketti- autot	Kuorma- autot	Linja- autot	Yhteensä
2030	+7,5 %	+19,5 %	+44,0 %	+1,0 %	+10,3 %
2040	+35,9 %	+43,5 %	+50,8 %	+1,0 %	+36,7 %
2040, sisältäen hinnoittelun toimenpiteet	+17,8 %	+30,1 %	+52,4 %	+1,0 %	+20,3 %

Joukkoliikenneinvestoinneista huolimatta liikennesuoritteet kasvavat mallinnuksissa. Suoritteiden kasvuun vaikuttaa väestönkasvu, joka on otettu mallinnuksessa huomioon. Joukkoliikenneinvestointien takia suoritteet eivät kuitenkaan kasva niin merkittävästi, kuin ne kasvaisivat ilman niitä. Tämä johtuu kulkutapaosuuksien muutoksista. Jotta autoliikenteen suorite ei kasvaisi ollenkaan, tulisi kulkutapaosuuden vuonna 2030 olla 36,1 prosenttia (nyt 40,2 prosenttia ja ennustettu vuoden 2030 osuus 36,8 prosenttia) ja kestävien kulkumuotojen yhteensä 63,9 prosenttia (nyt 59,8 prosenttia ja ennustettu vuoden 2030 osuus 63,2 prosenttia).

Kulkutapaosuudet

	Autot	Joukkoliikenne	Pyöräily	Jalankulku
2021	40,2 %	17,8 %	8,8 %	33,2 %
2030	36,8 %	20,1 %	9,0 %	34,1 %
2040	37,6 %	18,7 %	9,2 %	34,6 %
2040, sisältäen hinnoittelun toimenpiteet	34,5 %	19,9 %	9,6 %	36,0 %

LIIKENNE – SUORITTEEN KEHITTYMINEN

Tieliikenteen suoritteiden lisätoimet, fossiilittoman liikenteen tiekartta

Fossiilittoman liikenteen tiekartassa on tunnistettu keinoja liikenteen päästöjen vähentämiseksi. Samat toimet on huomioitu myös KAISU2:ssa [11]. Alle on listattu tieliikenteen suoritteeseen vaikuttavia keinoja ja niiden suuruusluokkia. Keinoissa painottuvat valtion tekemät toimenpiteet.

Toimenpidekokonaisuus, suorite	Vaikutus 2030
Liikennejärjestelmän tehostaminen	-2,8 %
Etätöiden lisääminen	-0,9 %
Liikenteen palveluiden edistäminen	-0,9 %
Yhdistetyt kuljetukset	-0,2 %
Tieliikenteen päästökauppa	-4,5 %

Liikennejärjestelmän tehostamisen toimenpiteitä ovat kestävä liikunnan edistäminen mm. kestävä liikunnan suunnitelmien toimenpiteitä toteuttamalla, kävelyn ja pyöräliikenteen investointiohjelman toteuttaminen, suurten ja keskisuuren kaupunkiseutujen joukkoliikenteen valtion avustuksen korottaminen, liikunnan ohjauksen valtion avustuksen korottaminen, mittojen massojen

täysimääräinen hyödyntäminen kuljetuksissa, väylien kunnossapidon parantaminen sekä logistiikan digitalisaation parantaminen.

Etätöiden lisääntymisen vaikutus on arvioitu puolivälin skenaariona koronapandemian aikaisen suurimman etätöityöpiikin ja edellisen vuoden tason perusteella.

Liikenteen palveluiden edistäminen sisältää Liikkuminen palveluna –konseptin (MaaS, Mobility as a Service). Päästövaikutusarvio perustuu kansainvälisiin selvityksiin.

Yhdistetyt kuljetukset vähentävät pääasiassa tavaraliikenteen päästöjä pitkällä, Suomen sisäisillä matkoilla. Toimenpiteen vaikutus Espooseen on keskimääräistä pienempi.

Tieliikenteen päästökauppa olisi joko EU:n tai Suomen tasoinen järjestelmä, jossa polttoaineen hintaan lisättäisiin päästöoikeuden arvo.

Tieliikenteen suoritteiden lisätoimet, Espoon ilmasto-vahti

Espoon ilmasto-vahtissa on kolme kokonaisuutta, joiden avulla pyritään vähentämään henkilöautoliikenteen suoritteita: raideliikenteen lisääminen (2.1), kävelyn ja pyöräilyn edistäminen (2.2) sekä joukkoliikenteen sujuvoittaminen (2.3). Ensimmäisessä tunnistettuja toimenpiteitä ovat Raide-Jokerin käyttöönotto, Länsimetron rakentaminen ja kaupunkiradan rakentaminen. Kaikki nämä toimenpiteet sisältyvät HELMET-liikennemallilla tehtyyn ennusteeseen. Lisäksi toimenpidekokonaisuuteen kuuluu ESA-oikoradan suunnittelu, mutta sitä ei ole huomioitu skenaarioissa, sillä se on vasta suunnitteluvaiheessa eikä tarkempi rakentamisaikataulu ole tiedossa.

LIIKENNE – SUORITTEEN KEHITTYMINEN

Kävelyn ja pyöräilyn edistämiseen liittyvä kokonaisuus sisältää toimenpiteitä kävelyn olosuhteiden parantamiseksi, pyöräilyn edellytysten parantamiseksi, kestävästä liikenteestä ja liikkumisesta viestimiseksi sekä lasten ja nuorten kestävästä liikkumisesta edistämiseksi. HELMET-liikennemalli ei ota huomioon kävelyn ja pyöräilyn edellytysten parantamista, joten toimet on skenaariolaskennassa arvioitu erillisinä toimenpiteinä. Pääkaupunkiseudulla noin 2 prosenttia henkilöautoliikenteen päästöistä syntyy 1-2 km pituisilla automatkoilla ja noin 8 prosenttia 2-5 km pituisilla automatkoilla, henkilöautoliikenteen synnyttäessä noin 60 prosenttia tieliikenteen hiilidioksidipäästöistä. Kaikkia lyhyitä henkilöautomatkoja ei saada korvattua kävelyllä tai pyöräilyllä, mutta karkean arvion perusteella kolme neljästä matkasta voitaisiin korvata kestäväällä liikkumismuodolla. Tällöin toimenpiteen vähennyspotentiaali olisi noin 4,5 prosenttia. Tästä osa sisältyy fossiilittoman liikenteen tiekartassa arvioituun, liikennejärjestelmän tehostamisen (-2,8 prosenttia), jolloin Espoossa olisi kaupunkirakenteesta johtuvaa lisäpotentiaalia noin 1,7 prosenttia.

Ilmastovahdissa esitetyt joukkoliikenteen sujuvoittamisen toimenpiteet ovat pitkän tähtäimen joukkoliikennekäytävien suunnittelu, liityntäpysäköinnin kehittäminen, uusien kestävien liikennepalveluiden kehittäminen sekä joukkoliikenteen sujuvuuden varmistaminen. Isojen raideinvestointien valmistumisen myötä nämä ovat erittäin tarpeellisia toimenpiteitä, jotta ennustetut käyttäjämäärät toteutuvat. Näin ollen voidaan katsoa, että tämänkin kokonaisuuden toimenpiteet ovat jo mukana liikennemallilla tehdyssä arvioissa.

Lisätoimet skenaarioissa

Lisätoimenpiteet on otettu huomioon skenaarioissa seuraavasti:

- **Pessimistinen skenaario:** Ei lisätoimenpiteitä
- **Suomi 2035-skenaario:** Kaikki fossiilittoman tiekartan lisätoimenpiteet.
- **Hiilineutraali Espoo 2030-skenaario (HNE2030):** Kaikki fossiilittoman tiekartan lisätoimenpiteet, minkä lisäksi Espoon oman ilmastovahdin mukaiset kävelyn ja pyöräiliikenteen edistämisen toimenpiteet.

LIIKENNE – SKENAARIOT

Liikenteen päästöjen kehitystä arvioitaessa on skenaarioissa otettu huomioon seuraavat liikennesuoritetta ja yksikköpäästöjä koskevat oletukset:

Pessimistinen skenaario

- **Liikennesuorite:** HELMET-mallituksen mukaiset arviot vuosille 2030 ja 2035.
- **Yksikköpäästöt:** Kansallisen perusennusteen mukainen HSL-alueen tarkenne, ei fossiilittoman tiekartan lisätoimenpiteitä

Suomi 2035-skenaario

- **Liikennesuorite:** HELMET-mallituksen mukaiset arviot vuosille 2030 ja 2035 sekä fossiilittoman liikenteen tiekartan toimenpiteet lukuun ottamatta liikenteen hinnoittelun toimenpiteitä.
- **Yksikköpäästöt:** Kansallinen perusennusteen mukainen HSL-alueen tarkenne, fossiilittoman tiekartan toimenpiteistä mukana liikennejärjestelmän tehostaminen, tieliikenteen päästökauppa, fossiilisten polttoaineiden korvaaminen ja autokannan nopeampi uudistuminen.

Hiilineutraali Espoo 2030-skenaario (HNE2030)

- **Liikennesuorite:** HELMET-mallituksen mukaiset arviot vuosille 2030 ja 2035 sekä fossiilittoman liikenteen tiekartan toimenpiteet lukuun ottamatta liikenteen hinnoittelun toimenpiteitä.
- **Yksikköpäästöt:** Kansallinen perusennusteen mukainen HSL-alueen tarkenne ja kaikki fossiilittoman tiekartan lisätoimenpiteet.



Kuva. HELMET-mallin tarkastelualue tehdyssä tarkastelussa

TEOLLISUUS JA TYÖKONEET

Teollisuuden ja työkoneiden osuus Espoon päästöistä on pieni. Vuonna 2020 osuus oli noin 1,5 prosenttia. Sektorin päästökehitykseen vaikuttavat teollisuudessa käytetyt polttoaineet ja työmailla käytettyjen bensiinikäyttöisten työkoneiden polttoaineenkulutus. Skenaarioissa teollisuuden ja työmaiden päästöjen on arvioitu kehittyvän seuraavasti:

Pessimistisessä skenaariossa päästöjen oletetaan pysyvän vuoden 2020* tasolla asukaskohtaisesti tarkasteltuna. Kaupungin väkiluvun kasvun ja kasvavan rakennustarpeen myötä päästöjen oletetaan kasvavan aikavälillä 2021-2035.

Suomi 2035-skenaariossa päästöjen oletetaan kansallisten politiikkatoimien tuloksena laskevan teollisuudessa 53 prosenttia vuoteen 2035 mennessä. Työkoneiden päästöjen oletetaan laskevan 20 prosenttia. Päästöihin vaikuttavia toimia ovat muun muassa kevyen polttoöljyn bio-osuuden jakeluvaihtojen kasvu, työkoneiden taloudelliset ajotavat ja EU-tason politiikkatoimet (mm. Stage-asetuksen ja päästökauppajärjestelmän kehitys). Oletukset perustuvat Keskipitkän aikavälin ilmastopolitiikan suunnitelmaan, KAISU2 [11]. Muutos on laskettu viimeisen viiden vuoden päästöjen keskiarvosta, sillä vuosittaiset vaihtelut sektorin sisällä ovat olleet suuria.

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) teollisuuden ja työkoneiden päästöjen oletetaan laskevan hieman Suomi 2035-skenaariota nopeammin kaupungin toteuttamien toimien ansiosta. Kaupunki muun muassa kilpailuttaa infraurakat. Päästöttömät työmaat green deal-sopimuksen mukaisesti ja edistää vähähiilistä rakentamista kaavoituksen keinoin. HNE2030-skenaariossa teollisuuden päästöjen oletetaan laskevan Suomi 2035-skenaariota mukaisesti 53 prosenttia ja työkoneiden 50 prosenttia. Muutos on laskettu viimeisen viiden vuoden päästöjen keskiarvosta, sillä vuosittaiset vaihtelut sektorin sisällä ovat olleet suuria.

*Laskennassa on hyödynnetty vuotta 2020, sillä HSY:n vuoden 2021 tiedoissa on havaittu mahdollista epäjohtonmukaisuutta.



JÄTTEIDEN KÄSITTELY

Jätteiden käsittelyn päästöt sisältävät kaatopaikkasijoituksesta, kompostoinnista ja jätevedenkäsittelystä aiheutuvat kasvihuonekaasupäästöt. Espoossa jätteiden käsittelyn päästöjen osuus kokonaispäästöistä oli vuonna 2021 noin 3 prosenttia. Jätehuollosta Espoossa vastaa HSY. Sektorin päästöjen kehityksestä eri skenaarioissa on oletettu seuraavasti:

Pessimistisessä skenaariossa jätteiden käsittelyn asukaskohtaisten päästöjen oletetaan pysyvän vuoden 2021 tasolla. Sektorin päästöjen oletetaan kasvavan aikavälillä 2021-2035 kaupungin väkiluvun ja tästä johtuvan jätteen määrän kasvun myötä.

Suomi 2035-skenaariossa jätteiden käsittelyn päästöjen arvioidaan laskevan 4 prosenttia vuoden 2020 tasosta vuoteen 2030 mennessä. Samankaltaisen päästökemityksen arvioidaan toteutuvan myös aikavälillä 2030-2035. Oletus perustuu Keskipitkän aikavälin ilmastopolitiikan suunnitelmassa (KAISU2) esitettyihin arvioihin [11].

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) jätteiden käsittelyn päästöjen oletetaan laskevan 68 prosenttia aikavälillä 2021-2030, minkä jälkeen päästöjen oletetaan pysyvän vuoden 2030 tasolla. Arvio perustuu HSY:n asiantuntija-arvioon [16] jätehuollon päästöjen kehityksestä. Kaupungin toteuttamia toimia ovat mm. valtakunnallisen kiertotalouden green deal -sopimuksen toteuttaminen, muovin lajittelun tehostaminen, rakennus- ja purkumateriaalien kierron edistäminen sekä kiertotalouden tavoitteelliseen kehittämiseen sitoutuminen. Viimeisen 10 vuoden aikana Espoon jätteiden käsittelyn päästöt ovat laskeneet 42 prosenttia. Erityisesti kaatopaikoille sijoitettujen jätteiden päästöt ovat laskeneet.

MAATALOUS

Maataloussektorin kasvihuonekaasupäästöjen laskenta perustuu Espoon alueen maatalousmaan pinta-alatietoihin ja kotieläinten lukumäärätietoihin, jotka Luonnonvarakeskus tuottaa [1]. Maataloussektorin päästöt Espoossa ovat hyvin pienet. Vuonna 2021 maatalouden osuus kokonaispäästöistä oli noin 0,1 prosentin luokkaa. Sektorin päästöjen oletetaan kehittyvän tulevaisuudessa seuraavasti:

Pessimistisessä skenaariossa maatalouden päästöjen oletetaan pysyvän muuttumattomana aikavälillä 2021-2035.

Suomi 2035-skenaariossa päästöjen oletetaan laskevan 11 prosenttia vuoden 2020 tasosta vuoteen 2035 mennessä. Oletus perustuu Keskipitkän aikavälin ilmastopolitiikan suunnitelmassa (KAISU2) [11] esitettyihin oletuksiin.

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) maatalouden päästöjen oletetaan kehittyvän Suomi 2035 –skenaarion oletusten mukaisesti.



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Kuvituskuvat: Sitowisen materiaalipankki

SKENAARIOLASKENTOJEN TULOKSET



SKENAARIOIDEN TULOKSET

Arvioitujen kolmen eri skenaarion perusteella päästöt Espoossa kehittyvät seuraavasti:

Pessimistinen skenaariossa Espoon päästöt laskevat vuoden 1990 tasosta 24 prosenttia vuoteen 2025 mennessä, 25 prosenttia vuoteen 2030 mennessä ja 23 prosenttia vuoteen 2035 mennessä. Skenaarion mukaisen päästökehityksen perusteella Espoon päästöt olisivat 817,6 kt CO₂-ekv vuonna 2035, eli lähes samalla tasolla kuin vuonna 2021.

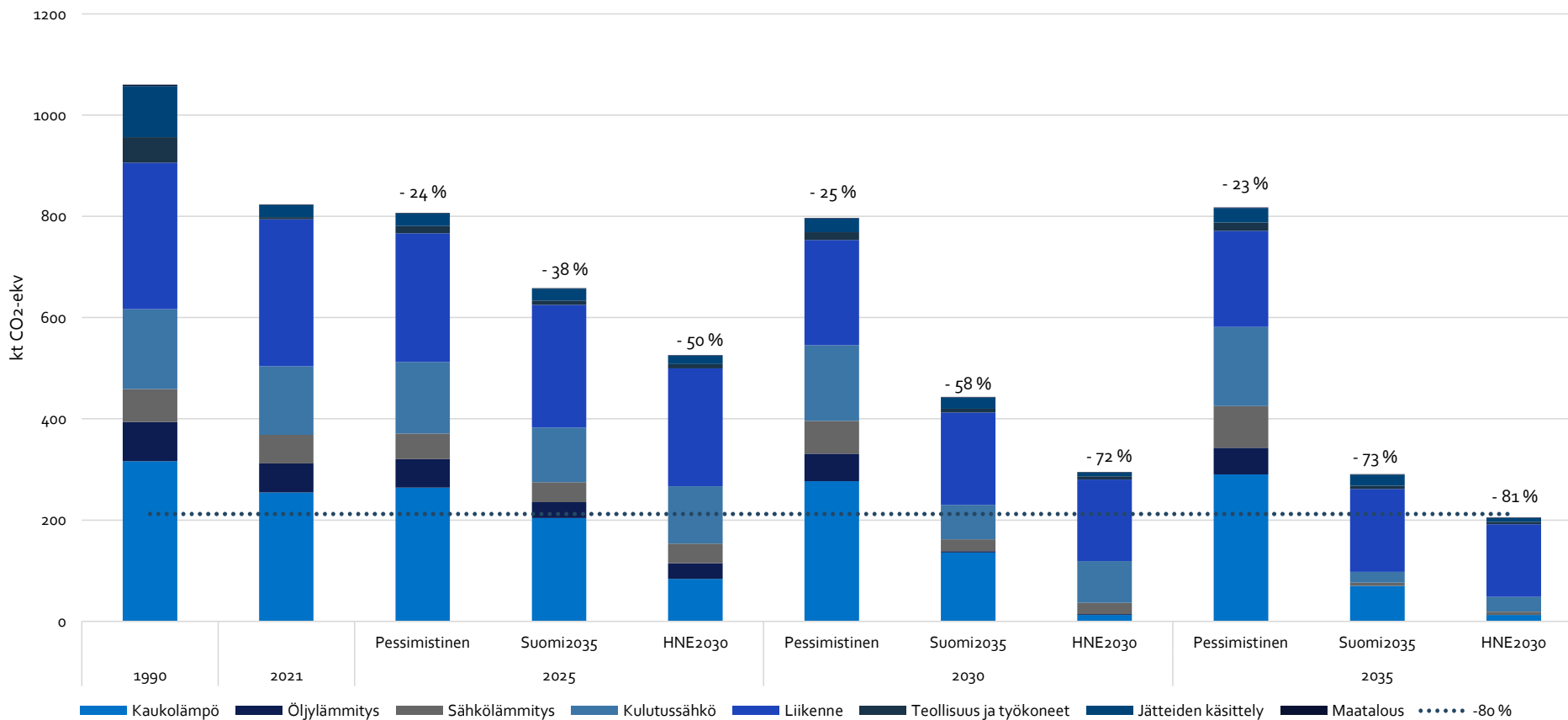
Suomi 2035-skenaariossa Espoon päästöt laskevat vuoden 1990 tasosta 38 prosenttia vuoteen 2025 mennessä, 58 prosenttia vuoteen 2030 mennessä ja 73 prosenttia vuoteen 2035 mennessä. Jotta 80 prosentin päästövähennystavoite toteutuisi vuonna 2035, tulisi päästöjen laskea skenaarion mukaisen kehityksen lisäksi vielä 78,7 kt CO₂-ekv.

Hiilineutraali Espoo 2030-skenaariossa (HNE2030) Espoon päästöt laskevat vuoden 1990 tasosta 50 prosenttia vuoteen 2025 mennessä, 72 prosenttia vuoteen 2030 mennessä ja 81 prosenttia vuoteen 2035 mennessä. Päästövähennystavoite (-80 %) toteutuu siis vuoteen 2035 mennessä HNE2030-skenaarion mukaisella päästökehityksellä. Jotta tavoite toteutuisi jo vuonna 2030, tulisi päästöjen laskea arvioidun lisäksi vielä 83,0 kt CO₂-ekv vuoteen 2030 mennessä.

Skenarioiden tulokset on esitetty kuvassa 1. Kuvassa on esitetty arvioidut päästöt vuosina 2025, 2030 ja 2035 kussakin skenaariossa sekä toteutuneet päästöt vuosina 1990 ja 2021. Skenariolaskentojen tulokset on lisäksi koottu taulukoihin 1-3.



Kuva 1: Espoon kasvihuonekaasupäästöt vuosina 1990 ja 2021 sekä Pessimistisen-, Suomiz035- ja HNE2030 –skenaarioiden mukaiset arvioidut päästökelytykset vuosille 2025, 2030 ja 2035.



Taulukko 1: Espoon kasvihuonekaasupäästöt vuosina 1990 ja 2021 sekä Pessimistisen-skenaarion mukainen arvio päästöjen kehityksestä vuosina 2025, 2030 ja 2035. Taulukossa on lisäksi esitetty muutos vuosien 1990 sekä 2021 ja tavoitevuosien 2025, 2030 ja 2035 välillä.

Espoo	1990	2021	2025	2030	2035	Muutos 2021-2025	Muutos 2021-2030	Muutos 2021-2035	Muutos 1990-2025	Muutos 1990-2030	Muutos 1990-2035
Kaukolämpö	316,3	254,7	264,4	276,9	290,0	4 %	9 %	14 %	-16 %	-12 %	-8 %
Öljylämmitys	77,8	57,5	56,1	54,4	52,7	-2 %	-5 %	-8 %	-28 %	-30 %	-32 %
Sähkölämmitys	64,7	56,1	50,6	64,6	82,5	-10 %	15 %	47 %	-22 %	0 %	27 %
Kulutussähkö	157,6	135,5	141,5	149,3	156,3	4 %	10 %	15 %	-10 %	-5 %	-1 %
Liikenne	289,3	290,4	253,9	208,1	189,8	-13 %	-28 %	-35 %	-12 %	-28 %	-34 %
Teollisuus ja työkoneet	50,5	4,6*	14,3	15,4	16,4	214 %	237 %	260 %	-72 %	-70 %	-68 %
Jätteiden käsittely	101,0	23,7	25,2	27,1	28,9	6 %	14 %	22 %	-75 %	-73 %	-71 %
Maatalous	2,9	1,0	1,0	1,0	1,0	0 %	0 %	0 %	-66 %	-66 %	-66 %
Yhteensä, kt CO ₂ -ekv	1060,2	823,4	806,9	796,7	817,6	-2 %	-3 %	-1 %	-24 %	-25 %	-23 %

* HSY:n vuoden 2021 tiedoissa on teollisuuden ja työkoneiden osalta havaittu epä johdonmukaisuutta. Tämä on otettu skenaariolaskennoissa huomioon, mutta vaikuttaa taulukossa esitettyihin vuoden 2021 ja tavoitevuosien välisiin muutoksiin.

Taulukko 2: Espoon kasvihuonekaasupäästöt vuosina 1990 ja 2021 sekä Suomi 2035 -skenaarion mukainen arvio päästöjen kehityksestä vuosina 2025, 2030 ja 2035. Taulukossa on lisäksi esitetty muutos vuosien 1990 sekä 2021 ja tavoitevuosien 2025, 2030 ja 2035 välillä.

Espoo	1990	2021	2025	2030	2035	Muutos 2021-2025	Muutos 2021-2030	Muutos 2021-2035	Muutos 1990-2025	Muutos 1990-2030	Muutos 1990-2035
Kaukolämpö	316,3	254,7	203,8	136,1	69,8	-20 %	-47 %	-73 %	-36 %	-57 %	-78 %
Öljylämmitys	77,8	57,5	31,4	2,6	0,0	-45 %	-95 %	-100 %	-60 %	-97 %	-100 %
Sähkölämmitys	64,7	56,1	39,5	23,3	6,8	-30 %	-58 %	-88 %	-39 %	-64 %	-90 %
Kulutussähkö	157,6	135,5	108,2	68,0	20,9	-20 %	-50 %	-85 %	-31 %	-57 %	-87 %
Liikenne	289,3	290,4	242,5	182,6	164,3	-16 %	-37 %	-43 %	-16 %	-37 %	-43 %
Teollisuus ja työkoneet	50,5	4,6*	8,6	7,3	5,9	89 %	60 %	30 %	-83 %	-86 %	-88 %
Jätteiden käsittely	101,0	23,7	23,3	22,7	22,2	-2 %	-4 %	-6 %	-77 %	-77 %	-78 %
Maatalous	2,9	1,0	1,0	0,9	0,9	-3 %	-7 %	-11 %	-67 %	-69 %	-70 %
Yhteensä, kt CO ₂ -ekv	1060,2	823,4	658,2	443,4	290,7	-20 %	-46 %	-65 %	-38 %	-58 %	-73 %

* HSY:n vuoden 2021 tiedoissa on teollisuuden ja työkoneiden osalta havaittu epä johdonmukaisuutta. Tämä on otettu skenaariolaskennoissa huomioon, mutta vaikuttaa taulukossa esitettyihin vuoden 2021 ja tavoitevuosien välisiin muutoksiin.

Taulukko 3: Espoon kasvihuonekaasupäästöt vuosina 1990 ja 2021 sekä HNE2030-skenaarion mukainen arvio päästöjen kehityksestä vuosina 2025, 2030 ja 2035. Taulukossa on lisäksi esitetty muutos vuosien 1990 sekä 2021 ja tavoitevuosien 2025, 2030 ja 2035 välillä.

Espoo	1990	2021	2025	2030	2035	Muutos 2021-2025	Muutos 2021-2030	Muutos 2021-2035	Muutos 1990-2025	Muutos 1990-2030	Muutos 1990-2035
Kaukolämpö	316,3	254,7	84,0	12,6	12,6	-67 %	-95 %	-95 %	-73 %	-96 %	-96 %
Öljylämmitys	77,8	57,5	30,9	1,4	0,0	-46 %	-98 %	-100 %	-60 %	-98 %	-100 %
Sähkölämmitys	64,7	56,1	38,7	22,3	6,3	-31 %	-60 %	-89 %	-40 %	-66 %	-90 %
Kulutussähkö	157,6	135,5	113,3	82,6	29,4	-16 %	-39 %	-78 %	-28 %	-48 %	-81 %
Liikenne	289,3	290,4	233,0	161,2	143,5	-20 %	-44 %	-51 %	-19 %	-44 %	-50 %
Teollisuus ja työkoneet	50,5	4,6*	8,3	6,5	4,7	82 %	42 %	3 %	-84 %	-87 %	-91 %
Jätteiden käsittely	101,0	23,7	16,5	7,6	7,6	-30 %	-68 %	-68 %	-84 %	-92 %	-92 %
Maatalous	2,9	1,0	1,0	0,9	0,9	-3 %	-7 %	-11 %	-67 %	-69 %	-70 %
Yhteensä, kt CO ₂ -ekv	1060,2	823,4	525,6	295,1	205,0	-36 %	-64 %	-75 %	-50 %	-72 %	-81 %

* HSY:n vuoden 2021 tiedoissa on teollisuuden ja työkoneiden osalta havaittu epä johdonmukaisuutta. Tämä on otettu skenaariolaskennoissa huomioon, mutta vaikuttaa taulukossa esitettyihin vuoden 2021 ja tavoitevuosien välisiin muutoksiin.

LISÄTOIMENPITEET



SITOWISE



LISÄTOIMET PÄÄSTÖVÄHENNYSTAVOITTEEN SAAVUTTAMISEKSI

Hiilineutraali Espoo 2030 -skenaarion mukaisella päästökehityksellä saavutetaan asetettu 80 prosentin päästövähennystavoite vuoteen 2035 mennessä. Jotta tavoite saavutettaisiin jo vuonna 2030, tulisi päästöjä vähentää skenaarion mukaisen päästövähennysarvion lisäksi vielä 83 kt CO₂-ekv vuoteen 2030 mennessä.

Hiilineutraaliustavoitteen saavuttamiseksi arvioitiin neljän liikenteen lisätoimenpiteen ja kolmen energiankulutuksen päästöihin vaikuttavan lisätoimenpiteen päästövähennyspotentiaalia.

Arvioidut liikenteen lisätoimenpiteet olivat:

- Nopeusrajoitusten alentaminen Espoon alueen maanteilla
- Sähköhenkilöautojen määrän nopeampi kasvu
- Ympäristövyöhykkeen asettaminen kuorma-autoille
- Matinkylä-Leppävaara pikaraitiotien rakentaminen

Arvioidut energiankulutuksen päästöihin vaikuttavat lisätoimenpiteet olivat:

- Kaupungin alueen suurten toimijoiden siirtyminen sertifioidun vihreän sähkön käyttöön
- Asukkaiden innostaminen sertifioidun vihreän sähkön ostoon
- Aurinkosähkön tuotannon lisääminen

Lisätoimenpiteiden päästövähennyspotentiaalin arvioinnin lisäksi tarkasteltiin hallituksen jakeluelvoitelain muutosesityksen vaikutuksia liikenteen päästöihin Espoossa. Esityksessä ehdotetaan muutettavaksi uusiutuvien polttoaineiden käytön edistämisestä liikenteessä annettua lakia. Ehdotuksen taustalla on pääministeri Petteri Orpon hallitusohjelman kirjaukset jakeluelvoitteesta sekä uusiutuvista lähteistä peräisin olevan energian käytön edistämisestä annetun Euroopan parlamentin ja neuvoston direktiivin (EU) 2018/2001 täytäntöönpano.

Lisätoimenpiteiden arvioinnin tulokset on esitetty taulukoissa 4 ja 5. Tiettyjen lisätoimenpiteiden laskennassa käytettyjä oletuksia on mahdollista muuttaa, mikäli taustatiedot päivittyvät. Muutokset taustaoletuksissa vaikuttavat luonnollisesti toimenpiteiden arvioituun päästövähennyspotentiaaliin.

Tunnistettujen lisätoimenpiteiden toteutuessa täysimääräisesti nykyoletusten mukaisesti saavuttaisi Espoo hiilineutraaliustavoitteensa vuoteen 2030 mennessä. Hiilineutraalius saavutetaan tunnistetuilla lisätoimenpiteillä, vaikka hallituksen kaavailema muutos jakeluelvoitelakiin toteutuisi. Mikäli jakeluelvoitelain muutos ei toteudu ja jakeluelvoite säilyy ennallaan, vähenisivät Espoon päästöt 83 % vuoden 1990 tasosta vuoteen 2030 mennessä. Jakeluelvoitelain muutoksen toteutuessa on päästövähennemä tavoitteen mukainen 80 % vuodesta 1990 vuoteen 2030.

Taulukko 4: Liikenteen lisätoimenpiteiden keskeiset oletukset ja arvioitu päästövähennyspotentiaali.

Lisätoimenpide	Keskeiset oletukset	Päästövähennys- potentiaali vuonna 2030, kt CO ₂ -ekv
Nopeusrajoitusten alentaminen Espoon alueen maanteillä	Alennetaan Espoon alueella sijaitsevien maanteiden, joilla nopeusrajoitus on 120 km/h (tiepituus noin 9 km), nopeusrajoitus 100 km/h:ssa ja niiden maanteiden, joilla nopeusrajoitus on 100 km/h (noin 25 km), nopeusrajoitus 80 km/h:ssa.	-6,7
Sähköhenkilöautojen määrän nopeampi kasvu	Oletetaan, että sähköhenkilöautojen määrä kasvaa Espoossa selvästi ennusteita nopeammin. Oletuksena Sähköautojen latausinfra kehittyminen Espoossa -selvityksen skenaariosta 4 esitetty henkilöautojen ja muiden henkilöautojen määrät.	-65,6
Ympäristövyöhykkeen asettaminen kuorma-autoille	Kielletään fossiilista polttoainetta käyttävien kuorma-autojen liikennöinti osalla Espoon kaduista. Laskennassa ympäristövyöhykkeeseen kuuluvien katujen osuus 60 % kaikkien katujen suoritteesta Espoossa.	-12,8
Matinkylä-Leppävaara pikaraitiotien rakentaminen	Matinkylä-Leppävaara-pikaraitiotien hiilidioksidiekvivalenttipäästöjen suuruusluokkaa on arvioitu Helsingin ja Espoon välin rakenteilla olevan Raide-Jokeri-pikaraitiotien hankearvioinnin perusteella. Raide-Jokeri on arviolta noin kaksi kertaa pidempi kuin Matinkylä-Leppävaara-pikaraitiotie, minkä perusteella voidaan arvioida, että Matinkylä-Leppävaara-pikaraitiotien hiilidioksidiekvivalenttipäästöjen vähenemän suuruusluokka olisi maksimissaan noin 2 000 tonnia vuodessa.	-2,0
Jakeluväitelmämuutoksen toteutuminen	Nykyisen jakeluväitelmän mukaiset polttoaineiden bio-osuudet muutetaan hallituksen jakeluväitelmämuutoksen mukaisiksi. Vuodesta 2028 alkaen hallitusohjelmassa ei ole määritetty bio-osuutta. Laskennassa on oletettu että bio-osuus on vuodesta 2028 alkaen sama kuin vuonna 2027.	+31,2

Taulukko 5: Energiankulutuksen päästöihin vaikuttavien lisätoimenpiteiden keskeiset oletukset ja arvioitu päästövähennyspotentiaali.

Lisätoimenpide	Keskeiset oletukset	Päästövähennys- potentiaali vuonna 2030, kt CO ₂ -ekv
Kaupungin alueen suurten toimijoiden siirtyminen sertifioidun vihreän sähkön käyttöön	Suuret toimijat Espoossa käyttävät toiminnassaan sertifioitua vihreää sähköä. Suuriin toimijoihin on sisällytetty Espoon kaupunki, Espoon asunnot, Fortum ja Microsoftin datakeskus (kaikkien toimijoiden arviota sähkönkulutuksesta ei laskentaan saatu, mutta tietoja on mahdollista täydentää jälkepäin). Laskennassa on otettu huomioon vaikutus niin kutsuttuun sähkön ”jäännöskertoimeen”. Vaikutus on arviolta hyvin pieni.	-2,9
Asukkaiden innostaminen sertifioidun vihreän sähkön ostoon	Asukkaat siirtyvät käyttämään sertifioitua vihreää sähköä. Laskennassa on arvioitu, että 25 % espoolaisten kulutussähköstä olisi sertifioitua vihreää sähköä vuonna 2030. Laskennassa on otettu huomioon vaikutus niin kutsuttuun sähkön ”jäännöskertoimeen”. Vaikutus on arviolta hyvin pieni.	-20,3
Aurinkosähkön tuotannon lisääminen	Aurinkosähköntuotantoa lisätään Espoon alueella. Aurinkosähkö on arvioitu päästöttömäksi ja sen on arvioitu korvaavan pörssisähköä. Laskennassa on arvioitu, että aurinkosähköä tuotetaan Espoon alueella 100 GWh vuonna 2030.	-3,5

KUSTANNUSVAIKUTUSARVIOT



YLEISTÄ

Kaupungit ja kunnat ovat avainasemassa Suomen pyrkiessä hiilineutraaliksi vuoteen 2035 mennessä. Kaupungit toimivat paikallisen ja alueellisen ilmastotyön alustoina ja mahdollistajina, vauhdittajina ja katalysaattoreina. Kaupunkien vastuulla ovat esimerkiksi kaavoitus, alueidensa maankäyttö, liikennesuunnittelu ja vastuu julkisista hankinnoista. Ilmastönäkökulma tulisi huomioida kaikissa näissä.

Valtaosa ilmastotoimenpiteistä vaatii investointeja. Jotkin toimenpiteet puolestaan vaikuttavat käyttökustannuksiin. Useat toimenpiteet, kuten esimerkiksi energiatehokkuusinvestoinnit kuitenkin tuottavat kustannussäästöjä pidemmällä aikavälillä tarkasteltuna. Joidenkin toimien osalta kustannussäästöt näkyvät lähes välittömästi. Ilmastotoimia toteuttamalla voidaan myös suojautua äkillisten, odottamattomien ja vaikeasti ennustettavissa olevien muutosten vaikutuksilta, kuten esimerkiksi fossiilisten polttoaineiden hinnanvaihtelulta.

Ilmastotyölle ja laajoille toimenpidekokonaisuuksille on haasteellista määrittellä kokonaishintaa. Useiden toimenpiteiden toteutusratkaisut ja käytettävä teknologia tarkentuvat tulevien vuosien aikana. Lisäksi esimerkiksi polttoaineiden ja materiaalien hinnat voivat vaihdella merkittävästikin. Toisaalta on myös haasteellista arvioida kustannuksia sille, että ilmastotyötä ei toteutettaisi.

Osana Hiilineutraali Espoo 2030-tiekartan taustatyötä tehtiin laadullinen arvio kaupungin ilmastotoimien kustannuksista. Arvion tavoitteena oli tuottaa tietoa eri toimenpiteiden kustannusvaikutuksista suhteessa toisiinsa ja tukea täten toimien priorisointia ja aikataulutusta. Arvion toteutti Sitowise Oy.



MENETELMÄ

Osana Hiilineutraali Espoo 2030-tiekartan taustatyötä arvioitiin kaupungin ilmastotoimenpiteiden toteuttamisen kustannusvaikutuksia. Arviossa tarkasteltiin kaupungin ilmastomuutoksen hillintätoimien investointi- ja käyttökustannuksia neljässä kaupungin ilmastotoimenpiteiden teemakokonaisuudessa:

- Energia
- Liikenne
- Maankäyttö ja rakentaminen
- Kiertotalous ja kestävät valinnat

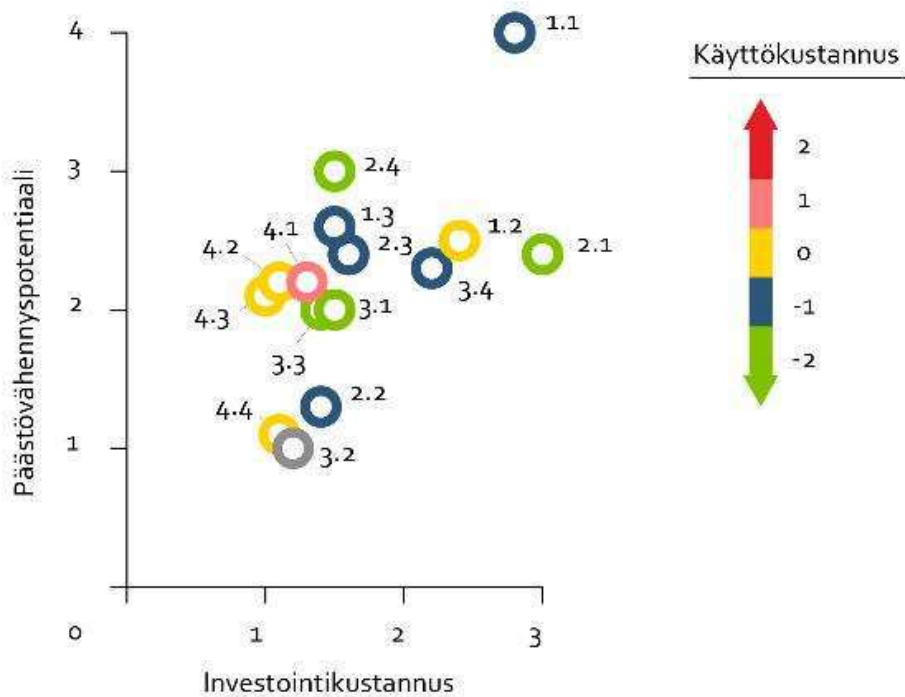
Kunkin teeman alle sijoittuvien 3-4 toimenpidekokonaisuuden investointi- ja käyttökustannukset arvioitiin kokonaistaloudellisesti. Toimenpidekokonaisuuksien kustannusvaikutusarviot yhdistettiin arvioon kokonaisuuksien päästövähennysvaikutuksista. Päästövähennysvaikutusten arviointia on peilattu HSY:n tuottamaan päästölaskentaan, mutta vaikutuksia on arvioitu myös HSY:n alueellisen päästölaskennan ulkopuolelle jäävien päästöjen, esimerkiksi rakentamisen, hankintojen ja kulutuksen päästöjen osalta.

Kustannusvaikutusarvion tulokset on esitetty kuvassa 2 ja arvion taustatiedot kunkin toimenpidekokonaisuuden osalta taulukossa 6-9.

Lisätoimenpiteiden kustannusvaikutusarvioiden tulokset on esitetty taulukoissa 10 ja 11. Lisätoimenpiteitä on arvioitu toimenpidekohtaisesti.



Kuva 2: Toimenpidekokonaisuuksien investointikustannukset (X-akseli) ja arviot päästövähennyspotentiaaleista (Y-akseli). Kuvassa on lisäksi esitetty arvio toimenpidekokonaisuuksien vaikutuksista käyttökustannuksiin (ympyrän väri).



Toimenpidekokonaisuudet:

- 1.1 Hiilineutraaliin kaukolämpöön siirtyminen
- 1.2 Uusiutuvan energian lisääminen
- 1.3 Energiatehokkuuden parantaminen
- 2.1 Raideliikenteen lisääminen
- 2.2 Kävelyn ja pyöräilyn edistäminen
- 2.3 Joukkoliikenteen sujuvoittaminen
- 2.4 Autoliikenteen päästöjen vähentäminen
- 3.1 Kestävä kaupunkirakenne
- 3.2 Ilmastovaikutusten arviointi
- 3.3 Kestävän liikkumisen edellytykset
- 3.4 Ilmastoviisas rakentaminen
- 4.1 Kiertotalouden ratkaisut
- 4.2 Ilmastoystävällinen ruokailu
- 4.3 Harkitut hankinnat
- 4.4 Kestävä matkailu ja tapahtumat

Investointikustannukset:

- 1 Matalat investointikustannukset
- 2 Kohtalaiset investointikustannukset
- 3 Korkeat investointikustannukset

Käyttökustannukset:

- 2 Toimenpiteillä saavutetaan huomattava käyttökustannusten alennus
- 1 Toimenpiteillä saavutetaan kohtalainen käyttökustannusten alennus
- 0 Toimenpiteillä ei vaikutusta käyttökustannuksiin
- 1 Toimenpiteillä käyttökustannuksia kohtalaisesti nostava vaikutus
- 2 Toimenpiteillä käyttökustannuksia merkittävästi nostava vaikutus

Päästövähennyspotentiaali:

- 1 Vähäinen vaikutus päästöihin
- 2 Kohtalainen vaikutus päästöihin
- 3 Merkittävä vaikutus päästöihin
- 4 Erittäin merkittävä vaikutus päästöihin

Taulukko 6: Kustannusvaikutusarviot ja arvio päästövähennyspotentialista energia-teeman toimenpidekokonaisuuksien osalta.

Tunniste	Toimenpidekokonaisuus	Investointikustannus	Selite	Käyttökustannus	Selite	Päästövähennyspotentiaali	Selite
1.1	Hiilineutraaliin kaukolämpöön siirtyminen	3	Toimenpidekokonaisuuden investointikustannukset tulevat olemaan merkittävät.	-1	Päästökaupan vaikutuksesta johtuen päästöttömät energialähteet tulevat olemaan käyttökustannuksiltaan fossiilisia halvempia.	4	Lämmityksen päästöjen osuus Espoossa on merkittävä. Kaukolämmön päästöjen osuus Espoon kokonaispäästöistä vuonna 2021 oli 31 prosenttia, joten päästövähennyspotentiaali on merkittävä.
1.2	Uusiutuvan energian lisääminen	2	Uusiutuvan energian tuottaminen rakennuskohtaisesti ja fossiilisista luopuminen eivät ole isossa kuvassa investointikustannuksiltaan merkittäviä.	0	Paikallisiin päästöttömiin energiamuotoihin investoiminen pienentää käyttökustannuksia. Kokonaisuuteen sisältyy toisaalta päästöttömän sähkön hankintaa, mikä lisää kustannuksia. Tämän johdosta kokonaisvaikutus käyttökustannuksiin on arvioitu neutraaliksi.	3	Fossiilisista polttoaineista luovutaan kaupungin ja Espoon Asuntojen kohteissa, eli vain pienessä osassa kaikista rakennuksista. Kaupungin ja Espoon Asuntojen rakennuskannassa hyödynnetään jatkossakin päästöttömää sähköä, tämä ei siis aiheuta lisäpäästövähennyksiä.
1.3	Energiatehokkuuden parantaminen	2	Toimenpiteet koskevat pääasiassa kaupungin omia ja Espoon Asuntojen rakennuksia. Toimenpiteet kattavat siis vain pienen osan rakennuskannasta, eikä niiden kustannusvaikutus ole merkittävä. Peruskorjausten yhteydessä tehtävä energiatehokkuuden parantaminen ei välttämättä kasvata kustannuksia merkittävästi.	-1	Energiatehokkuustoimenpiteet vähentävät energiantarvetta jonkin verran.	3	Energiatehokkuustoimenpiteillä on huomattava päästövähennysvaikutus. Toimenpiteet koskevat pääosin kaupungin ja Espoon Asuntojen rakennuskantaa. Lisäksi kokonaisuuden toimia on kohdennettu kaavoituksen keinoin pääosin uudisrakentamiseen, jossa potentiaalia on olemassa olevaan rakennuskantaan nähden vähemmän.

Taulukko 7: Kustannusvaikutusarviot ja arvio päästövähennyspotentialista liikenne-teeman toimenpidekokonaisuuksien osalta.

Tunniste	Toimenpidekokonaisuus	Investointikustannus	Selite	Käyttökustannus	Selite	Päästövähennyspotentialiaali	Selite
2.1	Raideliikenteen lisääminen	3	Raidehankkeiden investointikustannukset ovat suuret.	-2	Kokonaisvaltaisesti tarkasteltuna raideliikenteen käyttökustannukset ovat yksityisautoilun kustannuksia pienemmät. Pienemmällä infran ja kaluston määrällä pystytään kuljettamaan enemmän ihmisiä kuin henkilöautoilla. Raitiotien käyttökustannus on myös bussiliikennettä pienempi.	2	Raideliikenteen kärkihankkeilla pyritään vaikuttamaan kulkutapajakaumaan ja vähentämään henkilöautojen ajosuoritetta. Asukasmäärän kasvu puolestaan lisää liikkumista kaupungissa. Raideliikenteen käytön aikaiset päästöt ovat pienet verrattuna tieliikenteen ajoneuvoihin. HSY:n laskelma ei ota huomioon rakentamisen aikaisia päästöjä.
2.2	Kävelyn ja pyöräilyn edistäminen	1	Investointikustannuksista merkittävimmät ovat pyöräverkon parantaminen ja laajentaminen. Kustannus ei ole valtava suhteessa raidehankkeisiin.	-1	Pyöräily ja kävely ovat käyttäjälle halvin liikkumismuoto. Kokonaisuudessa ei suoraan viitata reittien ylläpitoon (esim. tehostettu talvi-kunnossapito), joten näitä vaikutuksia ei arvioitu.	1	Kävelyn ja pyöräilyn lisäämisellä vaikutetaan ajosuoritteeseen. Kävely ja pyöräily korvaavat kuitenkin pääosin lyhyitä matkoja, jolloin päästövähennyspotentialiaali on muita tieliikenteen ajosuoritteeseen vaikuttavia kokonaisuuksia pienempi.
2.3	Joukkoliikenteen sujuvoittaminen	2	Toimenpiteet eivät ole kustannuksiltaan merkittäviä suhteessa esimerkiksi raidehankkeisiin.	-1	Joukkoliikenteen sujuvoittaminen tekee liikkumisesta halvempaa.	2	Joukkoliikenteen sujuvoittamisella pyritään vaikuttamaan kulkutapajakaumaan ja vähentämään henkilöautojen ajosuoritetta. Asukasmäärän kasvu puolestaan lisää liikkumista kaupungissa. Vaikutus päästöihin perustuu joukkoliikenteen houkuttelevuuden lisäämiseen. Päästövähennyspotentialiaaliin vaikuttavat myös joukkoliikenteen käyttövoimat.
2.4	Autoliikenteen päästöjen vähentäminen	2	Sähköautojen latausinfran ja päästöttömien polttoaineiden jakeluinfran kustannukset eivät ole valtavia suhteessa esimerkiksi raidehankkeisiin.	-2	Sähköllä ja päästöttömillä polttoaineilla kulkevien ajoneuvojen käyttö-kustannukset tulevat olemaan bensa-autoja pienemmät.	3	Liikenteen päästöjen vähentämisessä on suuri potentialiaali ja henkilöautojen kulkumuoto-osuus on suurin. Puhtaampi käyttövoimiin siirtymisen päästövähennyspotentialiaali on merkittävä.

Taulukko 8: Kustannusvaikutusarviot ja arvio päästövähennyspotentialista maankäyttö ja rakentaminen -teeman toimenpidekokonaisuuksien osalta.

Tunniste	Toimenpidekokonaisuus	Investointikustannus	Selite	Käyttökustannus	Selite	Päästövähennyspotentialiaali	Selite
3.1	Kestävä kaupunkirakenne	2	Kaupunkirakenteen tiivistäminen ja olemassa olevaan infraan tukeutuminen on yleisesti ottaen kustannustehokasta. Toisaalta tiivistävään rakentamiseen voi liittyä kalliita erikoisratkaisuja, jotka nostavat kustannuksia.	-2	Tiiviin kaupunkirakenteen käyttökustannukset ovat per asukas pienemmät kuin hajanaisemman rakenteen, koska ylläpidettävää infraa on vähemmän.	2	Olemassa olevan kaupunkirakenteen tiivistämisen ja täydennysrakentamisen päästövähennyspotentialiaali kohdistuu etenkin liikennesektorin päästöihin. Mikäli olemassa olevat lähipalvelut ovat toimivat ja riittävät, liikkumistarve on maltillinen ja toisaalta tiiviit alueet voivat tukeutua joukkoliikenteeseen.
3.2	Ilmasto-vaikutusten arviointi	1	Investointikustannukset ovat vähäiset.		Ei käyttökustannusvaikutusta.	1	Hiilinielujen säilyttämistä tukemalla aikaansaadaan myönteisiä ilmastovaikutuksia, joskaan ei suoria päästövähennyksiä.
3.3	Kestävän liikumisen edellytykset	1	Katso kohta "kestävä kaupunkirakenne". Toiminnoiltaan monipuolisen kaupunkirakenteen luomiseen ei liity erityistä lisäkustannusta.	-2	Katso kohta "kestävä kaupunkirakenne". Toiminnoiltaan monipuolinen kaupunkirakenne vähentää liikumisen kustannuksia.	2	Katso kohta "kestävä kaupunkirakenne".
3.4	Ilmastoviisas rakentaminen	2	Vähähiilinen ja kiertotalouden periaatteita noudattava infra nostaa rakentamiskustannuksia. Myös uudisrakennusten energiatehokkuuteen panostamisella on pieni kustannusvaikutus.	-1	Energiatukkaiden rakennusten käyttökustannukset ovat tyypillistä jonkin verran pienemmät. Vähähiilisen infran ylläpidon kustannuksiin liittyy epävarmuutta kokemustiedon puutteen vuoksi.	2	Toimenpiteet kohdistuvat etenkin infrarakentamiseen. Alueellisessa päästölaskennassa seurattavista päästöistä toimenpiteet vaikuttavat lähinnä työkoneiden päästöihin ja rakennusten energiankulutukseen. Vähähiilisen talon- ja infrarakentamisen tuottamat päästövähennykset näkyvät kulutusperusteisissa päästöissä.

Taulukko 9: Kustannusvaikutusarviot ja arvio päästövähennyspotentialista kiertotalous ja kestävät valinnat -teeman toimenpidekokonaisuuksien osalta.

Tunniste	Toimenpidekokonaisuus	Investointikustannus	Selite	Käyttökustannus	Selite	Päästövähennyspotentiaali	Selite
4.1	Kiertotalouden ratkaisut	1	Konkreettiset toimenpiteet (muut kuin selvitys ja viestintä luonteiset) ovat epäselviä. Investointikustannuksia on vaikea arvioida.	1	Kiertotalouden tukeminen vaatii (ainakin toistaiseksi) jatkuvia toimia, jotka aiheuttavat kustannuksia.	2	Materiaalien kierrätyksessä sekä uudelleenkäytössä päästövähennyspotentiaali liittyy paitsi siihen, että raaka-aineita kuluu vähemmän myös siihen, että esimerkiksi kuljetuksilta voidaan välttyä.
4.2	Ilmastoystävällinen ruokailu	1	Toimenpiteiden valmistelu aiheuttaa vähäisiä kustannuksia.	0	Ilmastotietoiset ratkaisut Espoon ateriapalveluissa eivät aiheuta merkittävää vaikutusta käyttökustannuksiin.	2	Ilmastoystävällinen, kuten kasvispainotteinen ruokailu vähentää päästöjä suhteessa esimerkiksi lihapainotteiseen ruokavalioon. Päästöjen kannalta merkittävämpi vaikutus on ruokahävikin vähentämisellä.
4.3	Harkitut hankinnat	1	Toimenpiteiden valmistelu aiheuttaa vähäisiä kustannuksia.	0	Etätulkkauksen vähentää käyttökustannuksia. Vähähiilisten hankintojen kustannusvaikutukset ovat epävarmoja.	2	Kaupungin hankintojen päästöjen voidaan esimerkiksi Kulma-hankkeessa kootun tiedon valossa arvioida olevan suhteellisen merkittävät. Toimenpidekokonaisuuden nykyiset toimet pilotoivat hiilijalanjälkilaskentaa ja kehittävät hankintakriteerejä mutta, mikäli nämä saadaan tulevaisuudessa jalkautettua osaksi kaikkia kaupungin hankintoja on päästövähennyspotentiaali suurempi.
4.4	Kestävä matkailu ja tapahtumat	1	Toimenpiteiden investointikustannukset ovat vähäiset.	0	Toimenpiteiden vaikutus käyttökustannuksiin on epävarma. Energiatsehokkuuteen liittyvät toimenpiteet esimerkiksi voivat vähentää kustannuksia, kun taas osa vähähiilisistä ratkaisuista voi kasvattaa kustannuksia.	1	Matkailun päästöjen vähentämisen toimet allokoituvat osittain myös muille sektoreille. Toimenpidekokonaisuuden tarkkojen päästövähennyspotentiaalien laskenta vaatisi tarkempia hiilijalanjälkilaskelmia.

Taulukko 10: Kustannusvaikutusarviot liikenteen lisätoimenpiteiden osalta.

Lisätoimenpide	Investointikustannus	Selite	Käyttökustannus	Selite
Nopeusrajoitusten alentaminen Espoon alueen maanteillä	1	Toimenpiteen investointikustannukset ovat matalat ja toimenpiteen toteutumisessa on kyse poliittisesta päätöksestä.	0	Toimenpiteellä on pieni tai vähäinen vaikutus käyttökustannuksiin. Käyttökustannukset voivat laskea, kun polttoaineenkulutus nopeusrajoituksen alenemisen myötä laskee.
Sähköhenkilöautojen määrän nopeampi kasvu	2	Sähköautojen hankintapäätökseen vaikuttaa espolaisten ostovoima ja muutokset siinä. Sähköautojen latausinfra ja päästöttömien polttoaineiden jakeluinfran kustannukset eivät kuitenkaan ole valtavia suhteessa esimerkiksi raidehankkeisiin.	-2	Sähköllä ja päästöttömillä polttoaineilla kulkevien ajoneuvojen käyttökustannukset tulevat olemaan bensa-autoja pienemmät.
Ympäristövyöhykkeen asettaminen kuorma-autoille	1	Toimenpiteen investointikustannukset ovat matalat ja toimenpiteen toteutumisessa on kyse poliittisesta päätöksestä.	-2	Sähköllä ja päästöttömillä polttoaineilla kulkevien ajoneuvojen käyttökustannukset tulevat olemaan bensa-autoja pienemmät.
Matinkylä-Leppävaara pikaraitiotien rakentaminen	3	Raidehankkeiden investointikustannukset ovat suuret.	-2	Kokonaisvaltaisesti tarkasteltuna raideliikenteen käyttökustannukset ovat yksityisautoilun kustannuksia pienemmät. Pienemmällä infra ja kaluston määrällä pystytään kuljettamaan enemmän ihmisiä kuin henkilöautoilla. Raitiotien käyttökustannus on myös bussiliikennettä pienempi.
Jakeluvuorotilain muutosesityksen toteutuminen	1	Toimenpiteen investointikustannukset ovat matalat ja toimenpiteen toteutumisessa on kyse poliittisesta päätöksestä.	0	Toimenpiteellä tavoitellaan yksityisautoilun käyttökustannusten laskua mutta vaikutuksista ei ole pidemmällä aikavälillä taetta.

Taulukko 11: Kustannusvaikutusarviot energian päästöihin vaikuttavien lisätoimenpiteiden osalta.

Lisätoimenpide	Investointikustannus	Selite	Käyttökustannus	Selite
Kaupungin alueen suurten toimijoiden siirtyminen sertifioidun vihreän sähkön käyttöön	1	Toimenpiteen investointikustannukset ovat maltilliset. Kaupungin näkökulmasta kustannuksiin voidaan katsoa kuuluvan esimerkiksi yhteistyön kehittäminen alueen yritysten kanssa.	1	Sertifioitu vihreä sähkö voi olla kustannuksiltaan pörssisähköä kalliimpaa. Hintaero voi kaventua pidemmällä aikavälillä.
Asukkaiden innostaminen sertifioidun vihreän sähkön ostoon	1	Toimenpiteen investointikustannukset ovat maltilliset. Kaupungin näkökulmasta kustannuksiin voidaan katsoa kuuluvan esimerkiksi yhteistyön kehittäminen alueen yritysten kanssa ja asukkaiden innostaminen erilaisin kampanjoin ja markkinoinnin keinoin.	1	Sertifioitu vihreä sähkö voi olla kustannuksiltaan pörssisähköä kalliimpaa. Hintaero voi kaventua pidemmällä aikavälillä.
Aurinkosähkön tuotannon lisääminen	2	Toimenpiteen investointikustannukset kohdistuvat pääosin espoolaisiin asukkaisiin ja yrityksiin. Aurinkopaneelijärjestelmien hinnat ovat viime vuosina laskeneet merkittävästi.	-1	Uusiutuvan sähkön pientuotannon kannattavuus riippuu pörssisähkön hinnan vaihteluista. Sähkön hinnan ollessa korkealla laskee sähkön pientuotanto sähkönkulutuksen kustannuksia.

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