

Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan of the



Document history			
Date	Version	Author	Changes
January 2023	V1	ICLEI	/
June 2023	V2	ICLEI	The template was amended to include a front-page note “The Action Plan template is for guidance only. Cities are encouraged to adapt it to their circumstances, while remaining mindful of the CCC Checklist and guidance documents” The description of Table A-1.3 was updated to include the distinction between sectors and actions The description of Table A-1.5: Graphics and charts was updated to include “, e.g.,sankey diagrams)” The description of Table A-2.3: Emissions gap was updated by eliminating “percentage” in the Baseline emissions heading Note 1 to Table A-2.3 was edited for clarity. The text was changed from “Residual emissions consist of those emissions which can’t be reduced through climate action and are being offset. Residual emission may amount to a maximum of 20 % of all emissions, as stated by the Mission Info Kit” to “Residual emissions represent the emissions that cannot be reduced through climate action and are being offset. Residual emission may amount to a maximum of 20 % of all emissions, as stated in the Mission Info Kit”. The numbering in the Action Plan Guidance was amended to match the numbering in the Action Plan Template. The Glossary of Terms in the opening of the document was amended to include definitions of IPPU and AFOLU emissions definitions. Page numbers were updated.

The Action Plan template is for guidance only. Cities are encouraged to adapt it to their circumstances, while remaining mindful of the CCC Checklist and guidance documents.

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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
This Action Plan summarizes the climate work as resolved in the City of Turku Sustainable Energy and Climate Action Plan 2029 (SECAP) and as reported at the CDP-ICLEI common reporting framework. Due to determined climate work since 2009, the baseline emissions for 2020 are already at very low level. Despite this fact, emissions have to be further reduced more than 75% to achieve the 2029 carbon neutrality target, i.e. -90% compared to the 1990 level. The Action Plan aims at making a comprehensive review of Turku's climate policies, relevant stakeholders and expected challenges along the way.

List of figures

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

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Abbreviations and acronyms

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

Abbreviations and acronyms	Definition
NZC	Net Zero Cities
AP	Action plan
CDP	the Carbon Disclosure Project, is the world's most widely used database of organizational

	environmental impact information such as global greenhouse gas emissions.
ICLEI	ICLEI – Local Governments for Sustainability is a global network of more than 2500 local and regional governments committed to sustainable urban development.
GHG	Greenhouse gas
SECAP	Sustainable Energy and Climate Action Plan (SECAP)

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

Turku aims to be carbon neutral by 2029 and climate positive from then onwards. The target of carbon neutrality by 2029 was decided by the City Council in the City Strategy on 16 April 2018. On 11 June 2018, the City Council approved the climate plan that adheres to the shared European (SECAP) model. The climate targets were further reinforced when the City Council decided on the revised city strategy on 14 February 2022 and the updated City of Turku Climate Plan was unanimously approved by the City Council on 16 May 2022. Over 80 experts from both the City Group and important stakeholders participated in the process of updating the Climate Plan and are also involved in the eight thematic advisory groups guiding the work.

The base year of the City of Turku Climate Plan is 1990 in accordance with the general baseline year of international climate policy. By year 2029 at the latest, Turku will reach carbon neutrality. This means that the sum of Turku's emissions, carbon sinks and potential offsets is zero or below. By 2029, emissions will be reduced by at least 90 per cent compared to the level in 1990.

In the City of Turku Climate Plan, emissions from monitoring year 2020 have also been reported in accordance with the requirements of the Covenant of Mayors. In the context of the Climate City Contract this data is used as the baseline. Compared to year 1990, emissions have already decreased by 59%. Emissions per capita in 2020 (2.6 t CO₂-eq) were merely a third of the emissions in 1990 (7.8 t CO₂-eq). Despite this fact, compared to the level in 2020, the emission reduction target set for the year 2029 is at least 75 per cent and emissions will continue to drop from 2029 to 2035. (*N.B., the emission reduction target for the year 2029 is more than 80% compared to the level in 2019. However, newer baseline is preferred.*)

On the basis of the scenario analysis, emissions per capita will be halved from the level in 2020 by 2025, and they will amount to 0.6 t CO₂-eq in 2029, which is less than the emission level required by the Paris Agreement. The greatest emission reductions between 2020 and 2029 will be achieved by transitioning to carbon neutral electricity (112.5 kt CO₂-eq), by using carbon neutral district heating (111.1 kt CO₂-eq) and by reducing the consumption of fossil petrol and diesel (67.3 kt CO₂-eq).

The impact of national measures (i.e., emissions reductions in existing strategies) and the impact of Turku's own measures (i.e., emissions gap to be addressed by action plan) are estimated to be equal. However, the national measures and Turku's own measures are mutually reinforcing and it's not possible to completely differentiate between the impacts of the two.

This Action Plan summarizes the climate work as resolved in the City of Turku Sustainable Energy and Climate Action Plan 2029 (SECAP) and as reported at the CDP-ICLEI common reporting framework. Turku joined the Covenant of Mayors in 2010 and has been reporting its progress annually through CDP since 2014.

For further details, see: <https://www.turku.fi/en/carbonneutralturku>

2 Work Process

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

Following the NZC theory of change / Climate transition Map the following pictures represents the City of Turku work process.

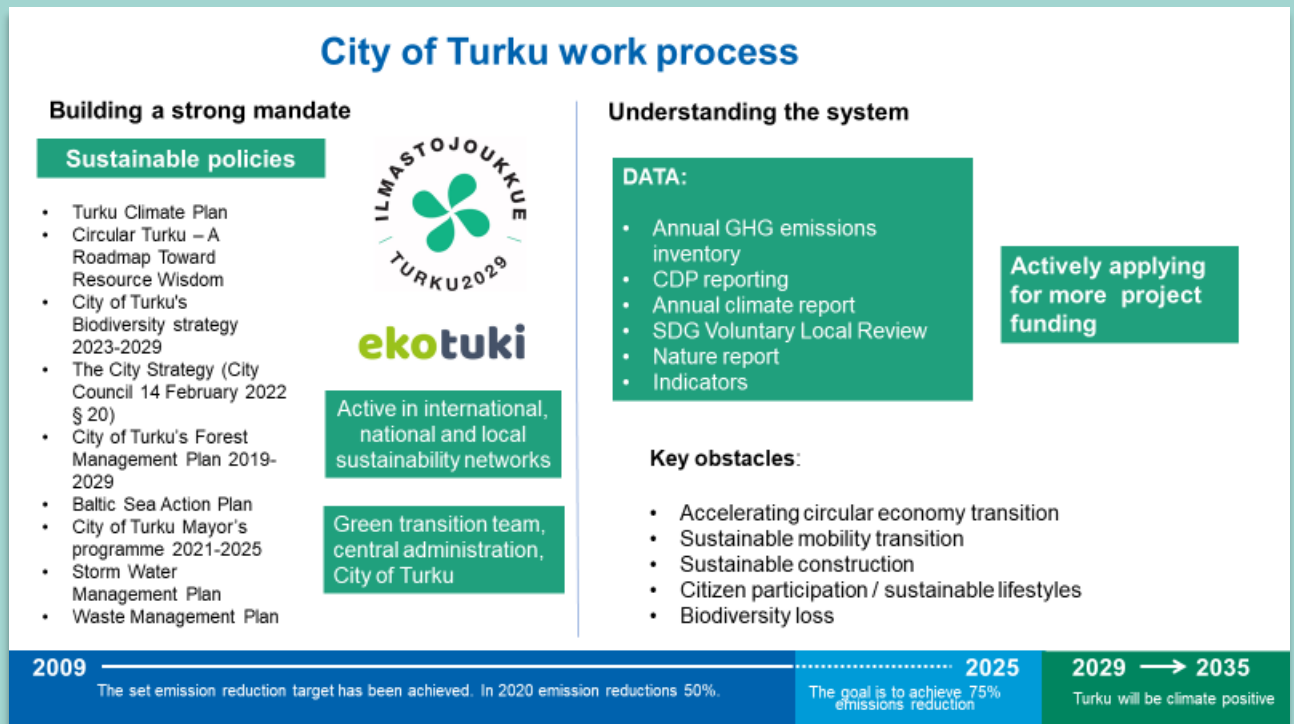


Figure 1. Climate transition map following the NZC theory of change part 1.

City of Turku has been building a strong mandate for climate work since 2009 and nowadays there are various sustainable policies regarding climate, circular economy, and biodiversity. Ilmastojoukkue (Climate team) is a network for companies and organizations that facilitates co-operation and knowledge sharing in climate and sustainability work between different regional actors. Ilmastojoukkue has been operating since 2018. Ekotuki (Eco support) is a network that educates city employees in sustainability work, network has been operating since 2011.

The City of Turku acknowledges that understanding the system and challenges from multiple perspectives is very important in sustainability work. There are many different data sets that helps following the progress for example in emissions reductions.



Figure 2. Climate transition map following the NZC theory of change part 1.

Turku is active in regional, national and international sustainability networks. To make sure that sustainability work is coordinated well, there are many working groups that involve different departments of the city and stakeholders to work together in climate, biodiversity, circular economy and sustainable financing. The City of Turku has been working with local business clusters for climate and the plan is to deepen the co-operation in the future. There are already several ways to facilitate citizen participation in city's work, yet the climate ambassador network will be piloted to support citizens climate work in the future. The City is actively applying for project funding to pilot new sustainability means and currently the ongoing projects are making strong examples to make it the new norm (Figure 2).

Learning and reflecting happens annually through CDP reporting and an annually compiled climate report. The Climate Plan of Turku is updated every 4 years to adjust pathways to the carbon neutrality goal. Collective learning happens also through various trainings that intent to build the shared knowledge and capabilities to catalyse change – during 2023 EU taxonomy trainings have been organized for different city departments and sustainability trainings (ecosupport) for employees. In 2022 there were a sustainability course for regional companies that will be organized again in 2024.

Climate communication supports embedding the good practices. Digital platform for climate and sustainability knowledge is being developed in upcoming years to support the sustainability transitions in the city organization and in the region.

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 and Explanations.

A-1.1: Final energy use by source sectors						
Base year	2020. Data has been reported at CDP-ICLEI Track and is only summarized here. For more details, see also A-1.5 and A-1.6					
Unit	MWh/year					
	Scope 1	Scope 2	Scope 3	Total		
Buildings	584,000	3,352,000		3,936,000		
(Fuel type/energy used)						
Transport	725,000			725,000		
(Fuel type/energy used)						
Waste						
(Fuel type/energy used)						
Industrial Process and Product ¹ Use (IPPU)						
(Fuel type/energy used)						
Agricultural, Forestry and Land Use ² (AFOLU)						
(Fuel type/energy used)						
A-1.2: Emission factors applied						
CDP-ICLEI Common Reporting Framework (CRF) has been utilized. For more details, see also A-1.5 and A-1.6						
For calculation in t or MWh of primary energy						
Primary energy/energy source	Carbon Dioxide (CO ₂)	Methane (CH ₄)	Nitrous Oxide (N ₂ O)	F-gases (hydrofluorocarbons and perfluorocarbons)	Sulphur hexafluoride (SF ₆)	Nitrogen trifluoride (NF ₃)
...	...	...	...	...	...	...

A-1.3: Activity by source sectors			
	2020. Data has been reported at CDP-ICLEI Track and is only summarized here. For more details, see also A-1.5 and A-1.6		
	Scope 1	Scope 2	Scope 3
Sector: Buildings	584,000	3,352,000	
(Activity)	energy consumption	energy consumption	
Sector: Transport	725,000		
(Activity)	energy consumption		
Sector: Waste			

(Activity)			
Sector: Industrial Process and Product Use (IPPU)			
(Activity)			
Sector: Agricultural, Forestry and Land Use (AFOLU)			
(Activity)			

A-1.4: GHG emissions by source sectors

Base year	2020. Data has been reported at CDP-ICLEI Track and is summarized here. For more details, see also A-1.5 and A-1.6			
Unit	t CO ₂ equivalent/year			
	Scope 1	Scope 2	Scope 3	Total
Buildings	113,600	234,900		348,500
Transport	205,800			205,800
Waste	14,700			14,700
Industrial Process and Product Use (IPPU)	30,200			30,200
Agricultural, Forestry and Land Use (AFOLU)	2,400			2,400
Total	366,700	234,900		601,600

A-1.5: Graphics and charts

Figure 3. Emission Inventory Data 2020 by sectors. (Reported to CDP)

t CO ₂ e	GWh	t CO ₂ e/GWh	Scope	Sector	Sub-sector	Activity
46394	598	78	2	Stationary energy	Residential buildings	Electric heating and electricity consumption
62794	986	64	2	Stationary energy	Residential buildings	District heating
28188	106	267	1	Stationary energy	Residential buildings	Oil heating
1412	144	10	1	Stationary energy	Residential buildings	Wood heating
53822	694	78	2	Stationary energy	Commercial buildings & facilities	Electric heating and electricity consumption
36201	568	64	2	Stationary energy	Commercial buildings & facilities	District heating
13524	51	267	1	Stationary energy	Commercial buildings & facilities	Oil heating
19745	255	78	2	Stationary energy	Industrial buildings & facilities	Electric heating and electricity consumption
15972	251	64	2	Stationary energy	Industrial buildings & facilities	District heating
16095	60	267	1	Stationary energy	Industrial buildings & facilities	Oil heating
54368	223	244	1	Stationary energy	Industrial buildings & facilities	Fuel consumption
158413	675	235	1	Transportation	On-road	Energy usage
328	14	23	1	Transportation	Rail	Energy usage (diesel)
44773	36		1	Transportation	Waterborne navigation**	Energy usage
2285	*		1	Transportation	Aviation	Energy usage
12821			1	Waste	Solid waste disposal	Landfill gas
235			1	Waste	Biological treatment	Composting
1604			1	Waste	Wastewater	Emissions from wastewater treatment
30230			1	IPPU	Industrial processes	F-gases
1314			1	AFOLU	Agriculture	Livestock
4120			1	AFOLU	Agriculture	Field cultivation
-3000			1	AFOLU	Forestry	Carbon sinks of forests
601638	4660					

*Municipal level data not available.

**Harbour emissions are included here.

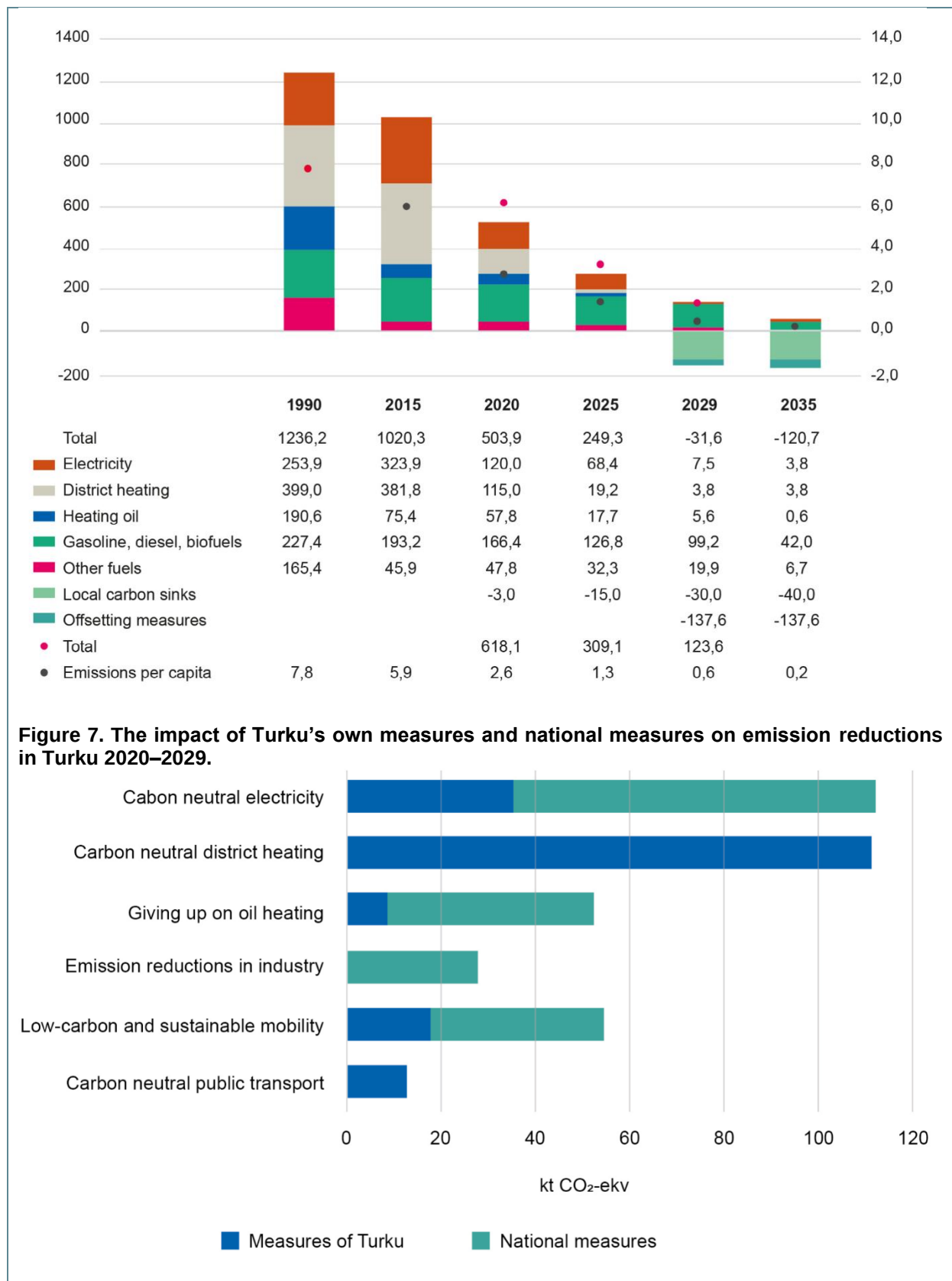
Figure 4. Emission Inventory Data 2020 by fuel types. (Reported to CDP and the Covenant of Mayors)

Sector	Electricity	District heating and cooling	CO2 emissions [t] / CO2 equivalent emissions [t]							Renewable energies		Total
			Liquid gas	Heating oil	Diesel	Gasoline	Coal	Other fossil fuels	Biogas	Biofuel	Other biomass	
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES												
Municipal buildings, equipment/facilities	6576	10673	0	0	5330	0	0	0	0	0	0	22580
Municipal buildings, equipment/facilities	5668	10673		0	5330							21672
Public lighting	908	0		0								908
Other	0	0		0								0
Tertiary (non municipal) buildings, equipment/facilities	47246	25528	0	13524	0	0	0	0	0	0	0	86298
Institutional buildings	47246	25528		13524								86298
Other	0	0		0								0
Residential buildings	46394	62794		28188							1412	138789
Industry, Non-ETS	19745	15972	1597	16095		8030	7125	37426	11		179	106179
IPPU, Product use	0	0		0								30230
Buildings, equipment/facilities and industries not allocated	0	0		0								0
Subtotal	119961	114967,18	1597	57807	5330	8030	7125	37426	11	0	1591	384076
TRANSPORT												
Municipal fleet	0	0	0	0	353	101	0	0	0	1	0	455
Road					353	101				1		455
Other					0	0				0		0
Public transport	0	0	0	0	12974	0	0	0	0	19	0	12993
Road					12646	0				19		12665
Rail					328	0				0		328
Local and domestic waterways					0	0				0		0
Other					0	0				0		0
Private and commercial transport	0	0	0	0	123973	62841	0	0	0	206	0	187020
Road					76915	62841				206		139963
Rail					0	0				0		0
Local and domestic waterways					44773	0				0		44773
Local aviation					2285	0				0		2285
Other					0	0				0		0
Transport not allocated					0	0				0		0
Subtotal	0	0	0	0	137300	62942	0	0	0	226	0	200468
OTHER												
Agriculture, Forestry, Fisheries												2434
Waste management												14660
Subtotal	0	0	0	0	0	0	0	0	0	0	0	17094
TOTAL	119961	114967	1597	57807	142630	70972	7125	37426	11	226	1591	601638

Figure 5. Emission factors for years 1990, 2015 and 2020, t CO₂-eq/MWh. (Reported to the Covenant of Mayors)

Year	Electricity	District heating	Fossil fuels						Renewable energy		
	Local		LPG	Heating oil	Diesel	Petrol	Carbon	Other fossil fuels	Biogas	Biofuel	Other biomasses
2020	0.078	0.064	0.234	0.267	0.267	0.277	0.342	0.271	0.001	0.002	0.010
2015	0.210	0.212	0.234	0.266	0.252	0.289	0.342	0.275	-	0.002	0.009
1990	0.234	0.312	0.234	0.269	0.252	0.289	0.342	0.285	-	-	0.009

Figure 6. Reported emissions for 1990, 2015 and 2020 and estimated development of emissions for years 2025, 2029 and 2035. The total emissions and targets are presented on the left vertical axis (kt CO₂-eq), and the emissions per capita are presented on the right vertical axis (t CO₂-eq per capita).



A-1.6: Description and assessment of GHG baseline inventory

Final energy usage and GHG emissions by sector as well as by fuel type are presented in the above figures for the baseline year 2020 according to the data previously reported at the CDP-ICLEI Track. The emission factors have also been provided according to the *Turku Climate Plan 2029, ANNEX 1: Description of the calculation method*.

The emissions calculated using the SECAP method have been presented. In addition to on-road traffic, the transportation includes also other means of transport such as waterborne navigation. Aviation includes emissions from landing and take-off cycle. The waste sector includes emissions from historical landfills which have been estimated by using first-order decay model and are not directly linked to current activities. The F-gas emissions from industrial processes have been reported according to the ALas model provided by the Finnish Environment Institute. In Turku, other IPPU emissions are minor. The AFOLU sector includes the carbon sinks of forests on the basis of the calculation made by the Natural Resources Institute Finland. The negative value for 2020 shows that the emissions from other forests have been balanced by increased carbon storage in the city-owned forests which have been fostered prioritising climate impacts since 2019.

The graph shows the normalised emissions in Turku in 1990, 2015 and 2020, calculated using the SECAP method (excl. other transport sectors, waste, IPPU and AFOLU). The figures are shown heating degree day corrected so that they equate to the climatological normal period 1981–2010. The figure also includes the estimated development of emissions, carbon sinks and offsetting measures for years 2025, 2029 and 2035. The total emissions and targets are presented on the left vertical axis (kt CO₂-eq), and the emissions per capita are presented on the right vertical axis (t CO₂-eq per capita).

The attainability of the set targets has been examined through a scenario analysis. In the last figure (figure 7) the impact of Turku's own measures and national measures on emissions in Turku in 2029 are compared to the level in 2020, calculated using the SECAP method. In the context of the Climate City Contract, Turku's own measures are considered as the emissions gap to be addressed by the action plan. However, the national measures and Turku's own measures are mutually reinforcing and it's not possible to completely differentiate between the impacts of the two.

More details can be found in the *Turku Climate Plan 2029, PART 4: Evidencing attainability of climate target*, https://issuu.com/turunviestinta/docs/turku_climate_plan_2029.

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 (regulation/ policy/ strategy/ action plan)	Level (Local, regional, national, EU)	Name & Title (Name of policy/ strategy/ plans)	Description (Description of policy/ strategy/ plans)	Relevance (Describe relevance/ impact on climate neutrality ambition)	Need for action (List any suggested action in relation – to be further picked in Module C-1)
Sustainable Energy and Climate Action Plan (SECAP)	Local	Turku Climate Plan	Turku Climate Plan 2029 adheres to the shared SECAP (Sustainable Energy and Climate Action Plan) model of the European Union. The plan covers both climate change mitigation and adaptation. The objective is to collectively implement the goal of a carbon-neutral city area by 2029, prepare for the impacts of climate change and consolidate Turku's position as an international pioneer of climate solutions. The plan also includes justifications as to why and how the objective of carbon neutrality will be met.	The Plan includes climate policies and milestones for years 2021 (completed), 2025 and 2029, as well as the development path leading up to year 2035.	In accordance with the City Strategy (City Council 14 February 2022 § 20), Turku adheres to sustainable development in all operations, implementing the sustainable development goals of the United Nations, and strives to be one the leading climate and nature cities in the world. The impact of Turku on climate change mitigation exceeds its own size. The local residents, businesses and communities are actively involved in the creation and implementation of climate solutions both locally and internationally. The city also prepares for changes caused by

					global warming as well as for extreme weather events.
Roadmap/ action plan	Local	Circular Turku – A Roadmap Toward Resource Wisdom	The Circular Turku roadmap is about creating the right conditions for the circular transition in the Turku region. The city can support this transition through different levers such as local regulations, urban planning, infrastructure development and information campaigns.	In 2018 the City Council of Turku unanimously approved the target that the city will become carbon neutral by 2029, in time for its 800th anniversary. On our ambitious path to carbon neutrality, it is important to address the indirect emissions that result from activities in Turku but occur elsewhere. Almost half of the emissions in our current economic system are generated by how we make and use products and how we produce food. These emissions often occur outside the city boundaries and are therefore difficult to track.	Turku wants to support a fair and inclusive circular transformation of our economic systems that benefits all city residents. By boosting low-carbon and resource-wise innovations, the city attracts and enables new businesses and jobs. Integrating nature-based solutions and increasing carbon sinks in urban parks and forests enhances biodiversity and environments that support well-being.
Action Plan	Local	City of Turku's Biodiversity strategy 2023-2029	Turku region has an important role in stopping biodiversity loss in Finland. The City covers less than	Biodiversity and the securing of ecosystems have a considerable impact on the	In accordance with the City Strategy (City Council 14 February 2022 § 20), Turku adheres to

			0,1% of Finland's area but over 12% of all endangered species in Finland can be found in the area. The target is to stop biodiversity loss and the destruction of ecosystems and as a long term target to restore lost ecosystems.	mitigation of climate change and adaptation.	sustainable development in all operations, implementing the sustainable development goals of the United Nations, and strives to be one of the leading climate and nature cities in the world. By decision of the City Board, Turku has signed the European Commission Green City Accord, committing to taking a significant step in preserving and improving biodiversity and taking part in European collaboration (City Board 23 November 2020).
Strategy/ Policy	Local	The City Strategy	The City Strategy is a document which answers to the following questions: • How will Turku look in the 2030s? • What are the key objectives the City sets for its operations? • What values do city personnel	Vision of the City Strategy: Turku invites everyone to participate in experiences, work, a forerunner's approach and sustainable growth - to live the best life in their lives.	In accordance with the City Strategy (City Council 14 February 2022 § 20), Turku adheres to sustainable development in all operations, implementing the sustainable development goals of the United Nations, and strives to be one of the leading climate and nature cities in the world. The impact of Turku on climate

			and elected officials promise to commit to in their activities?		change mitigation exceeds its own size. The local residents, businesses and communities are actively involved in the creation and implementation of climate solutions both locally and internationally. The city also prepares for changes caused by global warming as well as for extreme weather events.
Action Plan/Policy	Local	City of Turku's Forest management Plan 2019-2029	The general objectives of the forest plan are to safeguard biodiversity, mitigate climate change, improve the recreational potential of forests and the economic benefits of forest management.	The forest plan excludes all forests over 130 years of age from felling and increases the amount of decaying wood. Logging is not carried out during the bird's nesting season, except for a particularly justified reason. The plan pays special attention to the preservation of valuable natural sites and protected species, as well as to the protection of the habitats and transport links of the flying squirrel. The total	Previously, Turku's logging target for annual forest growth was 60%. The board decided to lower the level significantly. The new target is 40%. The decision will increase the carbon sequestration capacity of forests by several thousand tons in the next few years.

				number and value of tree stands and the carbon reserves of tree stands will increase.	
Action Plan	Regional	Baltic Sea Action Plan	The Baltic Sea Action Plan (BSAP), adopted by the HELCOM Contracting Parties in 2007 and updated in 2021, is HELCOM's strategic programme of measures and actions for achieving good environmental status of the sea, ultimately leading to a Baltic Sea in a healthy state.	Since its adoption, the BSAP has resulted in a number of environmental improvements such as a reduction in nutrient inputs to the sea, a better state of biodiversity and a decrease in maritime incidents and spills.	Guided by the HELCOM vision of <i>"a healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable economic and social activities"</i> .
Strategy/ Policy	Local	City of Turku Mayor's programme	Each group signing the programme undertakes to comply with the objectives recorded in the programme in their full extent and on all levels of decision-making. The programme will be approved by the delegates of all participating delegation groups and by the deciding bodies of the organisations that influence the work of the groups.	Turku is a pioneer in climate action and do our part in promoting the transition from a traditional economy to a circular economy.	Turku adheres to the Carbon Neutral Turku goal and implements the decisions made regarding Turku's carbon neutrality 2029 programme. Turku will update the action plan to achieve carbon neutrality (which was done in 2022), taking into account that the relatively greatest emission reduction goal will be targeted at transport in the coming term of Council

Action Plan/ Policy	Local	Stormwater Management Plan		Managing stormwater run-off is a growing challenge for many municipalities around the Baltic Sea region due to stormwater pollution, flooding and other effects imposing serious impacts on water quality, public health and local environments. At the same time, urban areas are densifying and land is more covered with sealed surfaces. These pressures are forcing planners and storm water specialists to develop cost- effective and holistic strategies dealing with greater volume and velocity of storm water.	
Action Plan/ Policy	Regional	Waste Management Plan			

A-2.2: Description & assessment of policies

Turku will reinforce the local, national and global impact of its actions by focusing impactful climate measures on investments and procurement, by actively embedding the climate aspect in local education and by encouraging local businesses towards responsible research, development and innovation and sustainable procurement. In accordance with the City Strategy, circular economy generates wellbeing and new jobs in the Turku region and strengthens the local business, which operates in a way that is respectful of nature.

A-2.3: Emissions gap

	Baseline emissions		Residual emissions offsetting ¹		Baseline emissions reduction target ²		Emissions reductions in existing strategies ³		Emissions gap (to be addressed by action plan) ⁴	
	(absolute) t CO ₂ -eq	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)
Buildings	349,000	58	41,000	28	308,000	68	150,000	64	158,000	72
Transport	206,000	34	115,000	78	91,000	20	49,000	21	42,000	19
Waste	15,000	2.4	7,000	5	8,000	2	4,000	2	4,000	2
Industrial Process and Product Use (IPPU)	30,000	5.0	15,000	10	15,000	3	15,000	6	0	0
Agriculture, Forestry and Land Use (AFOLU)	2,000	0.4	-30,000	-20	32,000	7	16,000	7	16,000	7
Total	602,000		148,000		454,000		234,000		220,000	

¹ Residual emissions represent the emissions that cannot be reduced through climate action and are being offset. Residual emission may amount to a maximum of 20 % of all emissions, as stated in the Mission Info Kit.

² Baseline reduction target = Baseline emissions – residual emissions.

³ Emission reductions planned for in existing action planning and strategies should be quantified per sector.

⁴ Emissions gap = Baseline emission reduction target – Emissions reduction in existing scenarios.

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

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

A-3.1: Systems & stakeholder mapping

(Fill out according to Action Plan Guidance and Explanations)

System description	Stakeholders involved	Network	Influence	Interest
Capacities, alliances	Companies in Turku and the Turku region	Turku Science Park, Turku Chamber of Commerce in Finland	Private companies have a great impact on the emissions of Turku	Mobilising citizens, communities, businesses, stakeholders, development partners and universities – the entire civil society – to join
Capacities, alliances, funds	The University of Turku, Turku University of Applied Sciences	Universities and applied	Mutual projects and new innovations	

		science universities		the work of creating climate actions and implementing a carbon-neutral Turku is key to achieving climate goals.
Capacities, alliances, funds	Companies in Turku and the Turku region	Companies of Turku key clusters (Maritime, Health, Experience, Clean and Tech clusters), Member companies of City of Turku Climate team, Turku Group's Subsidiaries	Private companies have a great impact on the emissions of Turku	
Alliances, capacities	Helsinki, Espoo, Vantaa, Tampere, Oulu, Lahti and other cities and municipalities in Finland	6aika network, FISU, HINKU	Mutual projects and cooperation within climate work	Climate issues are global and therefore cooperation with other cities facing similar challenges is often not only profitable but almost mandatory.
Capacities, alliances, funds	Municipalities of southwest Finland	Valonia		
Infrastructure, processes	All citizens in Turku and the Turku region	Turku citizens	Citizens have a great impact on the emissions of Turku and are an active stakeholder group.	Mobilising citizens, communities, businesses, stakeholders, development partners and universities – the entire civil society – to join the work of creating climate actions and implementing a carbon-neutral Turku is key to achieving climate goals.
Capacities	Sitowise, Ramboll, Finnish Environmental Institute	Sitowise and other consults and service providers	Capacity building and mutual learning	New innovations, new research and expanding the

Capacities, funds	Finland's fund for the future	Sitra	Capacity building, new innovations, new projects	knowledgebase. Support for climate work and upcoming challenges.
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A-3.2: Description of systemic barriers and opportunities – textual elements

The most challenging areas in our journey towards carbon neutrality and how we plan to solve them:

The transport sector will remain the biggest single emission source (although other energy consumption sources together still count the biggest share). Turku is taking measures to enable low-carbon transport system. Citizens engagement is crucial and require human resources and methodologies. Turku will not be able to tackle all the emissions alone. Mobility is a good example of where national and EU level actions e.g. tax measures, emission limits and funding have a significant role.

Big investments are needed in renovation of Turku's building infrastructure. Financing is available, but challenges include capital costs and limited human resources. It is also important get the building owners and building users to take measures. Several investments needs and plans are currently competing with each other – regarding political acceptance/support - and possible insufficient funding for some Climate actions such as large-scale public transport investments could slow down the implementation of Climate Action. However, Turku's financial position is relatively strong and availability and costs of external funding are rather good.

Data and digital technologies are needed to support knowledge-based policies and investment decisions.

Very complex working environment with various geographical and organizational boundaries generates a risk for implementation. Multisectoral expertise is needed to make efficient interventions. Green Procurement is being used as an effective means of Climate Action but needs still more efforts, the risk being the prevalence of old "business-as-usual" practices that may prioritize simple cost models over life-cycle and climate impact consideration. We need to keep on working consistently together across the city departments, subsidiaries and partners.

Availability of key personnel is important for continuity and success of the work. There is a growing demand of municipal climate experts and managers in Finland and emerging competition in recruitment. This can be addresses by e.g. long-term funding of the projects, sufficient number of permanent staff and long-term plans and contracts also for project staff as well as overall good HR policies.

Additional challenges are also the fragmented land ownership and lack of experience in nature-based solutions.

Political support for climate commitments in Turku is strong and shared, the Climate Plan has been adopted unanimously. However, the political environment has turned less favorable after the national elections. The local political environment is not heavily polarized, but there are different opinions on the level of ambition considering e.g. private car traffic. To minimize the risk also other benefits (economy, health) should be highlighted. Climate ambition is currently seen as a shared strategy of the city and stakeholders contributing to the competitiveness of the whole region.

Adequate involvement of the relevant state organizations is crucial and must be further emphasized during the next preparation steps. Turku has a track record of successful partnerships and stakeholder involvement. However, stakeholder relationships require constant facilitation and public opinions and media approaches may change over time – and political and opinion trends may also influence government policies and collaboration. Clear and active messaging and dialogue are key success factors.

Legislative requirements could complicate the implementation of the local compensation model and adversely affect carbon sinks. Research and active collaboration both nationally and in EU level is needed to minimize the risk. There are ongoing projects that develop the possibilities of carbon storages and capture in Finnish cities. Also, the Turku City Forest Management plan strengthens the carbon sinks in the forests owned by the city.

Social inequality and ageing people is a challenge for citizen engagement. Well-designed targeted services will be needed to tackle the risk. Equality and accessibility are key value for the city and for example the public transport is accessible to all. Turku is taking efforts to make sure that no-one is left behind in the green low-carbon transition. Circular Economy is developed as a means to provide meaningful approaches and practices to low-carbon living and business.

Extreme weather may make it more difficult to achieve e.g. energy efficiency and sustainable mobility targets. Adaptation to climate change must be considered alongside mitigation to minimize the risk. Adaptation is a binding part of Turku's Climate Plan, including the full assessment of risks, vulnerabilities and impacts following the European CoM Mayors' SECAP model. Ecological risks have been identified and actions prepared to address them.

Any disturbance in global stability (e.g. disease, refugees) could rapidly affect priorities. However, some climate actions are also precautionary measures (e.g. local renewable energy production). Changing weathers will influence local risk levels, for instance the temperature fluctuation at freezing point will cause more accidents and load on hospital and damage services.

Working in various local, national and international networks Turku can develop solutions and share ideas on topical challenges on reaching carbon neutrality.

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

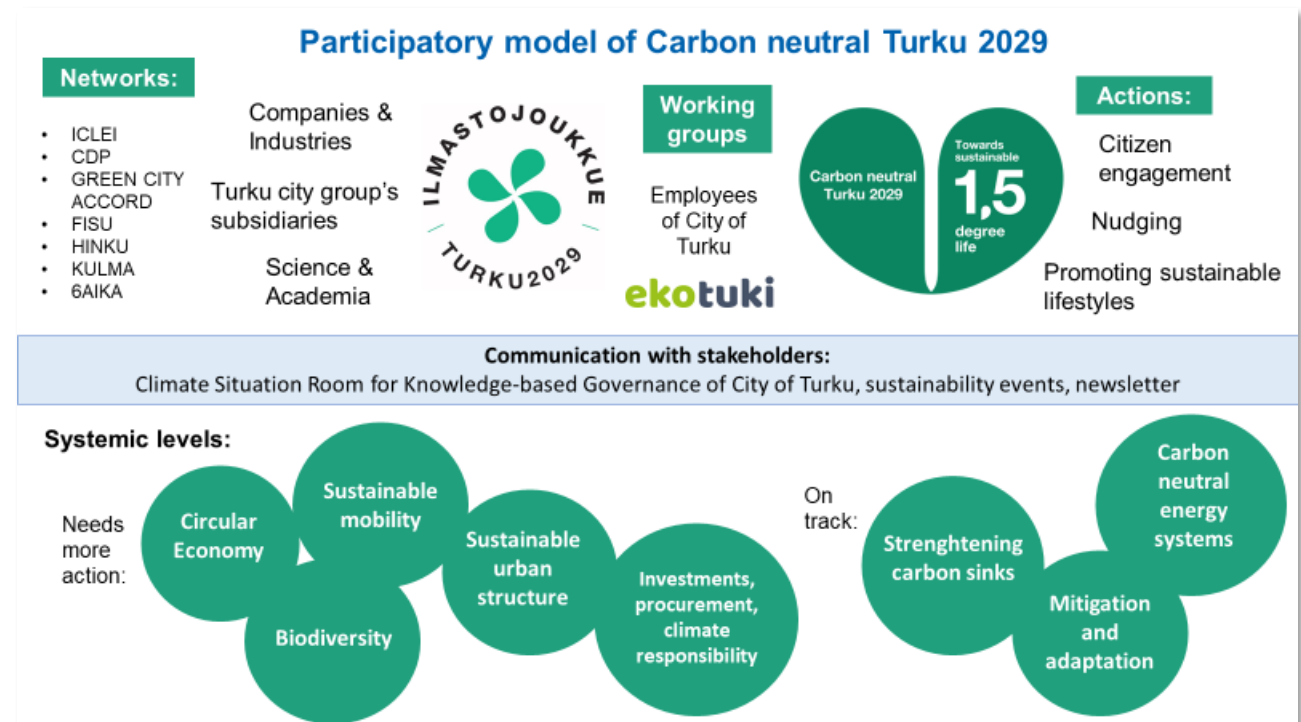


Figure 8. Participatory model of Carbon neutral Turku 2029.



City of Turku is taking part in various international, national and regional networks that support reaching carbon neutrality. Also various working groups with city departments and relevant stakeholders in climate, circular economy and biodiversity are strengthening the cross-sectoral work on sustainability.

Ilmastojoukkue (Climate team network for regional companies and organizations) is runned by city of Turku and aims to accelerate green transition in the area. Network organizes frequent events where companies, industries, different organizations, city group's subsidiaries, universities and academia are welcomed to share and discuss topical themes in circular economy, climate and sustainability. *Ekotuki* (ecosupport) network is a sustainability network for employees of city of Turku.

There are various models in use to accelerate the sustainable lifestyles "1.5-Degree life" among the citizens. City already has in use participatory platform such as "voice your opinion" [Voice Your Opinion - Kerrokantasi \(turku.fi\)](https://www.turku.fi/voice-your-opinion) and participatory budgeting to mention few. In NZC pilot project Turku will be developing new ways of citizen engagement through climate ambassador network that will among other things facilitate co-creation of sustainable lifestyles in Turku.

Communication to stakeholders will in future happen through "Climate situation room" that is currently under development. However, there is an ongoing newsletter and various events organized by the city, where sustainability transition is being discussed with stakeholders and informed of. Participatory model of City of Turku aims to target all the systemic levels of city's climate work (represented with green balls in the picture 3).

Also new projects and pilots are often developed together with local universities and companies.

4 Part B – Pathways towards Climate Neutrality by 2030

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

4.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

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

B-1.1: Impact Pathways					
Fields of action	Systemic levers	Early changes (1-2 years)	Late outcomes (3-4 years)	Direct impacts (Emissions reductions)	Indirect impacts (co-benefits)
Energy systems	Technology	The share of fossil energy decreases rapidly, and energy efficiency improves.	All electricity, heat, cooling and steam used in the area is produced in a carbon-neutral manner by 2029 at the latest, taking into account internal offsetting within the energy sector.	(Direct impact #1) 150 kt CO ₂ eq	The carbon handprint of Turku Energia (local energy company) materialises through the development of service products and an energy efficiency partnership – resulting in reduced emissions from customers and partners.
		New smart energy solutions are constantly developed, leading to an increased role of municipal residents in the energy transition.	A prerequisite for a climate-positive Turku is that renewable energy is produced not only for the city's own needs but also to serve the needs of other areas.		
					New solutions,

					innovations and energy expertise are developed in collaboration with businesses. An operating environment that is appealing to businesses and support their operation is created.
		...	...	...	...
Fields of action	Systemic levers	Early changes (1-2 years)	Late outcomes (3-4 years)	Direct impacts (Emissions reductions)	Indirect impacts (co-benefits)
Mobility & transport	Technology/ infrastructure and governance & policy and social innovation and learning & capabilities	Developing public transport and increasing its use is important for reducing greenhouse gas emissions caused by mobility	Greenhouse gas emissions from street and road transport will reduce by at least 50% from the level in 2015 by 2029.	49 kt CO ₂ eq	Turku actively creates sustainable mobility culture that includes both old and new ways of sustainable mobility as well as smart technical and digital solutions facilitating mobility.
		The service capacity of public transport will be significantly improved in order to reach the carbon neutrality objective of the City of Turku and to support sustainable and attractive urban development.	The objective for the share of sustainable means of transport according to the master plan and the Structural Model 2035 for the Turku Urban Region is over 66 per cent in 2030.		Cycling and walking conditions will be significantly improved around the year and citizens will be encouraged to actively engage in everyday exercise, incidental exercise and free time

					exercise. Cycling has a significant positive impact on wellbeing and health, and the benefits of cycling and active exercise will be promoted variedly.
			Turku is a pioneer of new kind of mobility and seeks to reach completely carbon-neutral mobility in the 2030s.		The development of waterborne transport, air transport and tourism towards a low-carbon direction will be advanced.
Fields of action	Systemic levers	Early changes (1-2 years)	Late outcomes (3-4 years)	Direct impacts (Emission reductions)	Indirect impacts (co-benefits)
Waste & circular economy	Infrastructure and governance	Reaching carbon neutrality requires circular economy solutions. New solutions can be piloted with different stakeholders in co-operation.	The approach of doing things together and participating through actions will also be applied to actions implementing circular economy and strengthening biodiversity.	4 kt CO ₂ eq	Circular economy generates wellbeing and new jobs in the Turku region and strengthens the local business, which operates in a way that is respectful of nature.
Fields of action	Systemic levers	Early changes (1-2 years)	Late outcomes (3-4 years)	Direct impacts (Emission reductions)	Indirect impacts (co-benefits)
Green infrastructure & nature-	Technology/Infrastructure and governance & policy	Endangered natural habitats and species will be	In order for Turku to reach carbon neutrality,	Included elsewhere	The Turku City Group's own nature measures

based solutions	and social innovation and democracy & participation and learning & capabilities	comprehensively identified, and their preservation will be advanced and secured. The implementation is also enhanced by the updated European Union Biodiversity Strategy and the reform of the nature conservation legislation.	carbon sinks in the area need to be increased. Increasing the ability of vegetation and soil to absorb carbon is an efficient and inexpensive climate measure that also has many other significant positive effects. A carbon sink absorbs and stores some chemical compound that contains carbon – usually carbon dioxide. In photosynthesis, plants and algae turn carbon dioxide in the air into their own biomass.		will be enforced in an exemplary way. By means of communication and involvement, citizens, businesses, communities and partners will be encouraged to participate.
Fields of action	Systemic levers	Early changes (1-2 years)	Late outcomes (3-4 years)	Direct impacts (Emissions reductions)	Indirect impacts (co-benefits)
Built environment	Technology/Infrastructure and governance & policy and social innovation and finance & funding and learning & capabilities	Turku will be active and use initiative in developing the community structure in the urban area. Through its own actions, Turku will advance climate objectives in the entire functional urban area.	In accordance with the objectives of the master plan, over 85% of residential floor surface areas in city plans will be located in a zone of condensing sustainable	Included elsewhere	Assessing climate impacts and anticipating climate resilience will also become a standard part of city planning, covering both the low-carbon aspect and adaptation to

			urban structure		climate change.
		Within the city borders of Turku, sustainable development of the community structure is steered through land use planning, land use, traffic planning, construction and development projects related to these. The master planning process 2029 of Turku supports reaching carbon neutrality and preparing for climate change.			Sustainable solutions will be searched by default and pilots will be developed also in other areas

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

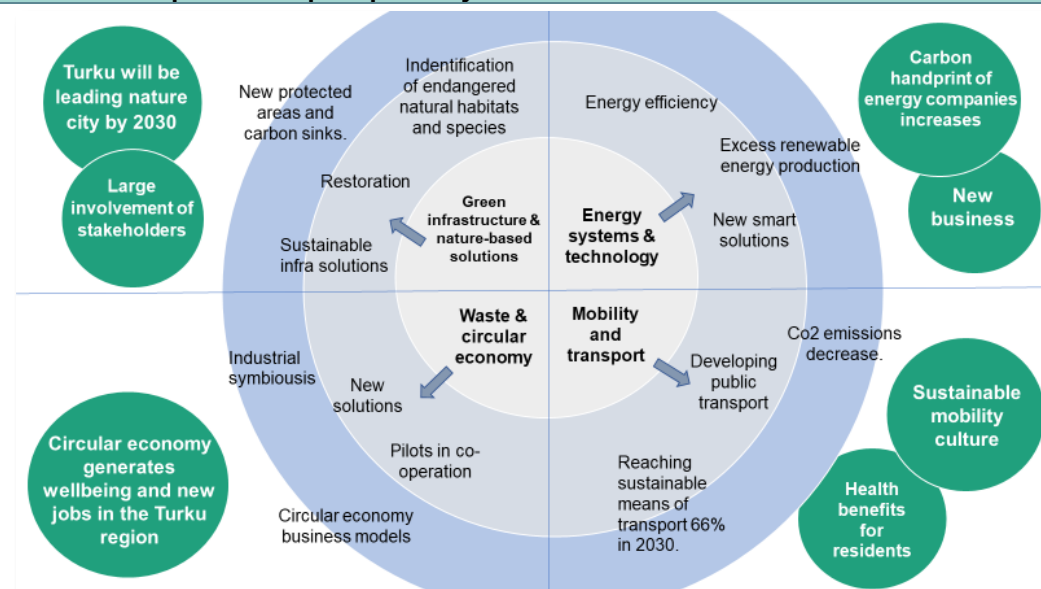


Figure 9. Description of impact pathways considering Energy systems & technology, Mobility and transport, Waste & circular economy and Green infrastructure & nature-based solutions.

4.2 Module B-2 Climate Neutrality Portfolio Design

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

B-2.1: Description of action portfolios - textual or visual Iris		
Fields of action	Portfolio description	
	List of actions	Descriptions
Energy systems	Carbon-neutral energy system	The heat, cooling, steam and electricity used in the Turku area will be produced in a carbon-neutral manner in 2029 at the latest (taking into consideration offsets within the energy system).
Mobility & transport	Low-carbon sustainable mobility	To reach the main targets of climate policy, the city will seek to reduce greenhouse gas emissions from street and road transport by at least 50% from the level in 2015 by 2029. Cycling and walking conditions will be significantly improved around the year. Public transport in Turku will be turned into a carbon neutral service by 2029. The transition to low-carbon vehicles and mobility services will be actively advanced. Housing, services, trading venues, workplace areas and infill construction focus areas will be placed in a way that they advance a city of walking, cycling and public transport.
Waste & circular economy	Circular transition economy	All city units and the Turku City Group’s subsidiaries seek to implement resource-wise approaches such as saving energy, advancing sustainable mobility, reducing material loss, fostering an operational culture that supports sustainable development and circular economy, and maintaining a reasonable consumption level in terms of natural resources. The aspect of circular economy will be taken into consideration in all construction work.
Green infrastructure & nature-based solutions	Strengthening biodiversity and carbon sinks	Biodiversity and the securing of ecosystems have a considerable impact on the mitigation of climate change and adaptation. According to the sixth assessment report of the Intergovernmental Panel on Climate Change, 30–50 per cent of land, fresh water and seas on the planet need to come under efficient protection or environmental rehabilitation to secure the functionality of ecosystems. Turku will seek to increase the carbon storage in the local vegetation and soil. Turku observes and participates in the development of new nature-based and technological solutions and develops collaboration with stakeholders.
Built environment	Sustainable urban structure and low-carbon construction	The urban structure affects emissions from energy, mobility, construction of infrastructure and pre-construction. The City of Turku will seek to minimise the carbon footprint of pre-construction, infrastructure building and housebuilding throughout the life cycle in an active and target-oriented way. The urban structure and construction also have a significant role in adapting to climate change.

B-2.2: Individual action outlines		
(Fill out one sheet per intervention/project)		
Action outline	Action name	Carbon Neutral Energy System
	Action type	Technical Intervention
	Action description	The heat, cooling, steam and electricity used in the Turku area will be produced in a carbon-neutral manner in 2029 at the latest (taking into consideration offsets within the energy system).
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology / infrastructure, finance & funding
	Outcome (according to module B-1.1)	The early changes include that the share of fossil energy decreases rapidly, and energy efficiency improves. The later outcomes will be that all electricity, heat, cooling and steam used in the area is produced in a carbon-neutral manner by 2029 at the latest taking into account internal offsetting within the energy sector. A prerequisite for a climate-positive Turku is that renewable energy is produced not only for the city's own needs but also to serve the needs of other areas. New smart energy solutions are constantly developed, leading to an increased role of municipal residents in the energy transition. New solutions, innovations and energy expertise are developed in collaboration with businesses. An operating environment that is appealing to businesses and support their operation is created.
Implementation	Responsible bodies/person for implementation	Turku Energia and Turun Seudun Energiatuotanto (local energy companies), City of Turku
	Action scale & addressed entities	Turku Region
	Involved stakeholders	Turku Energia and Turun Seudun Energiatuotanto (local energy companies), City of Turku, municipal residents, local businesses, University of Turku, Turku University of Applied Sciences, Turun Ylioppilaskyläsäätiö (TYS)
	Comments on implementation	The share of renewable energy of district heat was 79.6% already in 2020. The share of renewable energy of electricity sold by Turku Energia was 90.5%. The share of renewable energy of electricity and heat sold by Turku Energia will be at least 95 per cent in 2025.
Impact & cost	Generated renewable energy (if applicable)	depending on other sustainability criteria since the proportion is already very high
	Removed/substituted energy, volume, or fuel type	most importantly remaining coal and oil in the energy mix as reported at CDP-ICLEI track
	GHG emissions reduction estimate (total) per emission source sector	158 kt CO ₂ e/year in 2030 (buildings sector)
	Total costs and costs by CO ₂ e unit	Investment plan: 931.2 M€ 2023-2026

B-2.2: Individual action outlines

(Fill out one sheet per intervention/project)

Action outline	Action name	Low-carbon sustainable mobility
	Action type	Spatial and technical intervention
	Action description	Reduce greenhouse gas emissions from street and road transport by at least 50% from the level in 2015 by 2029. The share of sustainable means of transport is over 66 % in 2030.
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/ infrastructure, governance & politics,
	Outcome (according to module B-1.1)	The service capacity of public transport will be significantly improved in order to reach the carbon neutrality objective of the City of Turku and to support sustainable and attractive urban development. Cycling and walking conditions will be significantly improved around the year and citizens will be encouraged to actively engage in everyday exercise, incidental exercise and free time. The transition to low-carbon vehicles and mobility services will be actively advanced. Housing, services, trading venues, workplace areas and infill construction focus areas will be placed in a way that they advance a city of walking, cycling and public transport. The greenhouse gas emissions from street and road transport have been reduced by at least 50% from the level in 2015 by 2029. The share of sustainable means of transport is over 66 % in 2030.
Implementation	Responsible bodies/person for implementation	City of Turku, Turku City Group, Turun kaupunkiliikenne Oy
	Action scale & addressed entities	City of Turku Region
	Involved stakeholders	Citizens, research institutes, political leaders, businesses, experts, different municipality units, national government
	Comments on implementation	The achieved emission reduction from the 2015 level to 2022 was ten percent. Current development is in the right direction, but needs to be accelerated. The share of sustainable modes of transport in the city of Turku was 47 percent (2021). The electrification of busses of the Turku Region Traffic company Föli is proceeding rapidly and over 30 % of all the buses are e-vehicles, which operate around 50 % of all the rides.

Impact & cost	Generated renewable energy (if applicable)	depending on the national implementation of the Renewable Energy Directive
	Removed/substituted energy, volume, or fuel type	most importantly gasoline and diesel
	GHG emissions reduction estimate (total) per emission source sector	42 kt CO ₂ e/year in 2030 (transport sector)
	Total costs and costs by CO ₂ e unit	Investment plan: 353.1 M€ 2023-2026

B-2.2: Individual action outlines

(Fill out one sheet per intervention/project)

Action outline	Action name	Circular economy transition
	Action type	Spatial, technology and other interventions, nature-based solutions
	Action description	All city units and the Turku City Group's subsidiaries seek to implement resource-wise approaches such as saving energy, advancing sustainable mobility, reducing material loss, fostering an operational culture that supports sustainable development and circular economy, and maintaining a reasonable consumption level in terms of natural resources. The aspect of circular economy will be taken into consideration in all construction work.
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Technology/Infrastructure, governance & policy, social innovation, democracy & participation, learning & capabilities
	Outcome (according to module B-1.1)	Reaching carbon neutrality requires circular economy solutions. New solutions can be piloted with different stakeholders in co-operation. The approach of doing things together and participating through actions will also be applied to actions implementing circular economy and strengthening biodiversity. Circular economy generates wellbeing and new jobs in the Turku region and strengthens the local business, which operates in a way that is respectful of nature.
Implementation	Responsible bodies/person for implementation	City of Turku, Turku City Group's subsidiaries, businesses, research institutes
	Action scale & addressed entities	Turku Region
	Involved stakeholders	Citizens, companies in Turku, City of Turku, ICLEI, SITRA, research institutes, political leaders
	Comments on implementation	The Circular Turku roadmap provides a framework for concrete interventions that will lead the Turku region toward resource wisdom. The city will advance objectives for implementing a resource-wise energy system, outlined in the roadmap towards circular economy; 1) energy will be steered wisely, 2)

		waste heat will be harnessed into use, 3) communities and households will implement an energy transition. The aspect of circular economy will be taken into consideration in all construction work. Repair construction and reuse of old buildings and materials will be increased where possible. The City of Turku will seek to minimise the carbon footprint of pre-construction, infrastructure building and housebuilding throughout the life cycle in an active and target-oriented way. In investments and procurement, the City of Turku will seek to promote circular economy solutions and reduce consumption of natural resources. The approach of doing things together and participating through actions will also be applied to actions implementing circular economy and strengthening biodiversity. The actions of the City of Turku, the Turku City Group and Turku-based businesses and communities that contribute to the creation of a leading nature and climate city in line with the city strategy are put together, made visible and accelerated collectively. Climate actions of city residents are activated by means of communication and involvement
Impact & cost	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume, or fuel type	
	GHG emissions reduction estimate (total) per emission source sector	4 kt CO ₂ e/year in 2030
	Total costs and costs by CO ₂ e unit	Investment plan: 79.0 M€ 2023-2026

B-2.2: Individual action outlines

(Fill out one sheet per intervention/project)

Action outline	Action name	Strengthening biodiversity and carbon sinks
	Action type	Nature-based solutions
	Action description	Turku will seek to increase the carbon storage in the local vegetation and soil. Turku observes and participates in the development of new nature-based and technological solutions and develops collaboration with stakeholders.
Reference to impact pathway	Field of action	Green infrastructure & nature-based solutions
	Systemic lever	Technology/Infrastructure, governance & policy, social innovation, democracy & participation, learning & capabilities
	Outcome (according to module B-1.1)	Endangered natural habitats and species will be comprehensively identified, and their preservation will be advanced and secured. The implementation is also enhanced by the

		updated European Union Biodiversity Strategy and the reform of the nature conservation legislation. In order for Turku to reach carbon neutrality, carbon sinks in the area need to be increased. Increasing the ability of vegetation and soil to absorb carbon is an efficient and inexpensive climate measure that also has many other significant positive effects. The Turku City Group's own nature measures will be enforced in an exemplary way. By means of communication and involvement, citizens, businesses, communities and partners will be encouraged to participate.
Implementation	Responsible bodies/person for implementation	City of Turku, Turku City Group
	Action scale & addressed entities	Turku City Region
	Involved stakeholders	Research Institutes, private landowners, citizens, communities, partners, businesses
	Comments on implementation	In order to assess carbon sinks, carbon sinks in the forests of the Turku area have been calculated in collaboration with the Natural Resources Institute Finland (2022). Turku continues to develop the calculating and defining of carbon sinks and offsets e.g., through its own regional offsetting model and through the KUNTANIELU project that has been initiated in collaboration with partners. Turku observes, and actively participates in, discussions about offsetting. Turku also keeps track of research on the topic. Collaboration will be continued and developed with the Finnish Climate Change Panel, the National Resources Institute Finland, local higher education institutions and other partners. Carbon sinks in the Turku area and their development will be monitored annually. The Action Plan for Biodiversity Protection was just approved by the city council in June, 2023.
Impact & cost	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume, or fuel type	
	GHG emissions reduction estimate (total) per emission source sector	16 kt CO ₂ e/year in 2030
	Total costs and costs by CO ₂ e unit	Investment plan: 24.0 M€ 2023-2026

B-2.2: Individual action outlines

(Fill out one sheet per intervention/project)

Action outline	Action name	Sustainable urban structure and low-carbon construction
	Action type	Technical and spatial interventions

	Action description	The urban structure affects emissions from energy, mobility, construction of infrastructure and pre-construction. The City of Turku will seek to minimise the carbon footprint of pre-construction, infrastructure building and housebuilding throughout the life cycle in an active and target-oriented way. The urban structure and construction also have a significant role in adapting to climate change.
Reference to impact pathway	Field of action	Build environment
	Systemic lever	Technology/Infrastructure, governance & policy, social innovation, finance & funding, learning & capabilities
	Outcome (according to module B-1.1)	Short term: Turku will be active and use initiative in developing the community structure in the urban area. Through its own actions, Turku will advance climate objectives in the entire functional urban area. Within the city borders of Turku, sustainable development of the community structure is steered through land use planning, land use, traffic planning, construction and development projects related to these. The master planning process 2029 of Turku supports reaching carbon neutrality and preparing for climate change. Long term : In accordance with the objectives of the master plan, over 85% of residential floor surface areas in city plans will be located in a zone of condensing sustainable urban structure
Implementation	Responsible bodies/person for implementation	City of Turku, construction companies
	Action scale & addressed entities	Turku area
	Involved stakeholders	Citizens, local companies, companies along the value chain, communities, local Energy companies, construction industry
	Comments on implementation	
Impact & cost	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume, or fuel type	
	GHG emissions reduction estimate (total) per emission source sector	Included elsewhere (low-carbon sustainable mobility, carbon-neutral energy system)
	Total costs and costs by CO ₂ e unit	Included elsewhere (low-carbon sustainable mobility, carbon-neutral energy system)

B-2.3: Summary strategy for residual emissions

By year 2029 at the latest, Turku will reach carbon neutrality. This means that the sum of Turku's emissions, carbon sinks and potential offsets is zero or below. Emissions will be reduced by at least 90 per cent compared to the level in 1990. From 2029 onwards, Turku strives towards an increasing climate positivity, which means that the sum of local emissions, carbon sinks and compensations is increasingly negative.

In order for Turku to reach carbon neutrality, carbon sinks in the area need to be increased. Increasing the ability of vegetation and soil to absorb carbon is an efficient and inexpensive climate measure that also has many other significant positive effects. The existing forests will be fostered prioritising climate impacts, biodiversity and recreational use. Incentives will be created for landowners to increase the carbon storage, for instance by developing the local offsetting system.

Pilot projects with research institutions are already going on. Turku observes and participates in the development of both nature-based and technological solutions and develops collaboration with stakeholders, observing and taking into use solutions that enable capturing of carbon dioxide.

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

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

B-3.1: Impact Pathways							
Outcomes/ impacts addressed	Action/ project	Indicator No. (unique identified)	Indicator name		Target values		
					2025	2027	2030
Reaching a carbon-neutral energy system and increasing renewable energy	Carbon-neutral energy system, Sustainable urban structure and low-carbon construction	1	GHG emission from stationary energy		144,000	On track	41,000
Bringing emissions from the mobility system to a low level. Measures both modal shift and technological development of on-road transportation	Low-carbon sustainable Mobility, Sustainable urban structure and low-carbon construction	2	GHG emission from transport (on-road)		119,000	On track	91,000

Implementing circular economy and advances in resource wisdom	Circular economy transition	3	GHG emission from waste	reduced	On track	7,000
Reduction of F-gas emissions	Circular economy transition	4	GHG emission from IPPU	reduced	On track	15,000
Strengthening biodiversity and carbon sinks, developing offsetting measures.	Strengthening biodiversity and carbon sinks	5	GHG emission from AFOLU	-10,000	On track	-30,000
The share of renewable energy of electricity and heat sold by Turku Energia will be at least 95 per cent in 2025. The heat, cooling, steam and electricity used in the Turku area will be produced in a carbon-neutral manner in 2029 at the latest (taking into consideration offsets within the energy system).	Carbon-neutral energy system	6	GHG emission from grid supplied energy	88,000	On track	11,000
Overall development of Turku's climate work	all	7	Residual emissions % (compared to 2020 level, see introduction)	Less than 50	On track	Less than 25 (See note in the introduction)

B-3.2: Indicator Metadata

1

Indicator Name

GHG emission from stationary energy

Indicator Unit

t CO₂-eq

Definition	Greenhouse gas emissions from the operations of buildings.
Calculation	GHG inventory
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?	buildings
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	
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?	yes
Data requirements	
Expected data source	CRF
Expected availability	available
Suggested collection interval	annually
References	
Deliverables describing the indicator	Action Plan Guidance
Other indicator systems using this indicator	CRF

B-3.2: Indicator Metadata	
2	
Indicator Name	GHG emission from transport
Indicator Unit	t CO ₂ -eq
Definition	Greenhouse gas emissions from the operations of on-road vehicles.
Calculation	GHG inventory
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?	transportation
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	Mobility & transport
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	

Expected data source	CRF
Expected availability	available
Suggested collection interval	annually
References	
Deliverables describing the indicator	Action Plan Guidance
Other indicator systems using this indicator	CRF

B-3.2: Indicator Metadata	
3	
Indicator Name	GHG emission from waste
Indicator Unit	t CO ₂ -eq
Definition	Greenhouse gas emissions from waste treatment, waste incineration and landfills
Calculation	GHG inventory
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
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	
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?	yes
Data requirements	
Expected data source	CRF
Expected availability	available
Suggested collection interval	annually
References	
Deliverables describing the indicator	Action Plan Guidance
Other indicator systems using this indicator	CRF

B-3.2: Indicator Metadata	
4	
Indicator Name	GHG emission from IPPU
Indicator Unit	t CO ₂ -eq
Definition	Greenhouse gas emissions from industrial processes and product use within city boundary.
Calculation	GHG inventory
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?	IPPU
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	
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?	yes
Data requirements	
Expected data source	CRF
Expected availability	available
Suggested collection interval	annually
References	
Deliverables describing the indicator	Action Plan Guidance
Other indicator systems using this indicator	CRF

B-3.2: Indicator Metadata	
5	
Indicator Name	GHG emission from AFOLU
Indicator Unit	t CO ₂ -eq
Definition	Greenhouse gas emissions from livestock and field cultivation. Carbon sinks of forests.
Calculation	GHG inventory
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?	AFOLU
Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	
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
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	CRF
Expected availability	available
Suggested collection interval	annually

References	
Deliverables describing the indicator	Action Plan Guidance
Other indicator systems using this indicator	CRF

B-3.2: Indicator Metadata	
6	
Indicator Name	GHG emission from grid supplied energy
Indicator Unit	t CO ₂ -eq
Definition	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary
Calculation	GHG inventory
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?	buildings
Does the indicator measure indirect impacts (i.e., co- benefits?)	no
If yes, which co-benefit does it measure?	
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?	yes
Data requirements	
Expected data source	CRF
Expected availability	available
Suggested collection interval	annually
References	
Deliverables describing the indicator	Action Plan Guidance
Other indicator systems using this indicator	CRF

B-3.2: Indicator Metadata	
7	
Indicator Name	Residual emissions
Indicator Unit	%
Definition	The city's annual GHG emissions divided by GHG emissions in the 2020 baseline inventory.
Calculation	GHG inventory
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?	all

Does the indicator measure indirect impacts (i.e., co- benefits)?	no
If yes, which co-benefit does it measure?	
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	all
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	CRF
Expected availability	available
Suggested collection interval	annually
References	
Deliverables describing the indicator	Action Plan Guidance
Other indicator systems using this indicator	CRF

5 Part C – Enabling Climate Neutrality by 2030

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

5.1 Module C-1 Organisational and Governance Innovation Interventions

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

C.1.1: Enabling organisational and governance interventions					
Intervention name	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)
...	...	...	...	...	...
Climate Team	Participation of private sector in reaching the climate neutrality is crucial. Turku encourages all companies and organisations to join the city's	City of Turku's Climate and Environmental Policy Unit	Turku Group subsidiaries, local companies	By sharing climate actions, companies participate in making Turku carbon-neutral, inspire other actors to join	Among other companies in the Climate Team, also Turku Group subsidiaries' (energy, public transport, water) investments have big impact on GHG reductions.

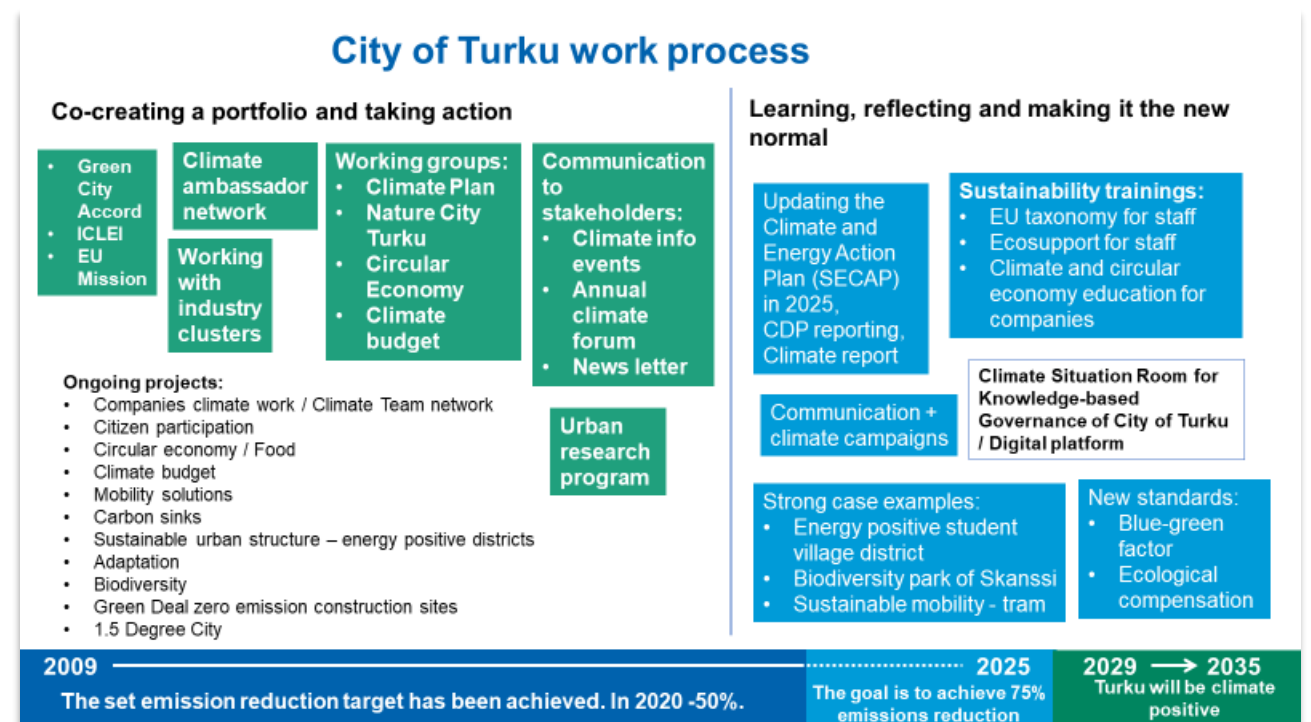
	"Climate team" by making a climate pledge. The climate actions are reported on the Carbon neutral Turku website and given visibility in the city's communication channels. The Team includes nearly 100 organisations.			climate work and gain visibility for their climate work. Through the Net Zero Cities Pilot, 1.5 degree city Climate team's existing activities will be developed and new ones created that encourage networking of the companies and give possibilities for knowledge sharing and peer-learning. These include the open-to-everyone and regularly held Climate Webinars where companies are sharing insights of their climate work to others. To further develop the concept, there will be open visits to local companies to learn about their climate work on the spot and encourage peer-learning in this way. Other possible	Implemented examples include local energy companies' Turku Energia's and Turun Seudun Energiatuotanto's over 500 M€ investments in energy transition in 2014-2023, and the energy positive wastewater treatment company, Kakolanmäki Wastewater Treatment Plant. The share of renewable energy of district heating was 79.6% already in 2020. The share of renewable energy of electricity sold by Turku Energia was 90.5%. The utility companies are also participating in Turku's 1,5 degree life campaign engaging citizens to lead sustainable lifestyles.
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				activities could be for example different networking events, sparring sessions, workshops and handing out climate work diplomas. Learning and information sharing is also supported by social media platforms.	
Climate Coordination Group	The update and review work of the Climate Plan was carried out by a large Climate Coordination Group, which included over 80 experts from the City Group, research institutes, stakeholders and partners. The climate coordination group was further divided into working groups focusing on the main topics of climate plan, such as 1. strategy, vision, implementation and monitoring 2. carbon-neutral energy system, 3. low-carbon sustainable mobility 4. communication	City of Turku's Climate and Environmental Policy Unit coordinated the work with additional support from outsourced experts.	City of Turku, Sitowise Oy, University of Turku, Turku University of Applied Sciences, partners, City Group companies, LUKE, SYKE, Valonia, local companies	The task of the group was to think in their working groups, how climate neutrality could be achieved by 2029. While working in the group engaged the participant	The Climate Coordination Group consists of experts of various fields, providing the best science-based knowledge available. The goals and methods of climate plan have been closely evaluated and analyzed in all of the working groups, with the aim to utilize the knowhow of various experts and engage all the participant into active climate work.

	and participation, 5. Sustainable urban structure and low carbon construction, 6. investments, procurement and climate responsibility, 7. strengthening biodiversity and carbon sinks, 8. Adaptation and risks and vulnerabilities. The Climate Coordination Group is a significant gatherer of information and know-how, and therefore its activities have been continued even after the update work was completed to support climate work.				
Turku Urban Research Programme	The City of Turku collaborates closely also with other universities to incorporate academic insights into strategic development and decision-making. A unique collaboration platform is the Turku Urban Research Programme, a joint initiative between the City of Turku, the University of Turku, and	City of Turku, University of Turku, Åbo Akademi University	students, researchers, research institutes	Academic insights are incorporated into strategic development and decision-making.	Science-based knowledge will enforce better decision making. Research in the urban research program can touch on pressing topics such as : means and solutions for maintaining and enhancing biodiversity in urban development, links between climate policy and land use development, encouraging environmentally friendly choices, circular economy

	Åbo Akademi University.				in urban development etc.
...	...	...	...	...	...

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



As seen in the visualization above, there are various organization and governance interventions that facilitate co-creation of the portfolio that brings together existing policies, actions and programmes with new or accelerated interventions in a set of transformative actions to achieve the 2030 goals. These interventions include various multidisciplinary working groups that work in implementation of Turku Climate Plan, biodiversity action plan, circular economy roadmap and climate budget. *Ilmastojoukkue* (Climate team network for regional companies and organizations) is run by city of Turku and aims to accelerate green transition in the area. Network organizes frequent events where companies, industries, different organizations, city group's subsidiaries, universities and academia are welcomed to share and discuss topical themes in circular economy, climate and sustainability.

The Climate Plan has been approved by Turku City Council as a binding document for the city group including subsidiaries. The implementation has been integrated into normal management procedures and is monitored by Turku City Council and City Board. The City Board is given a report on the implementation and development of the climate plan once a year as a minimum (in addition to the climate report given to Turku City Council). The attainment of the objectives set for 2021–2025–2029 will be checked each council term in connection with the updating of the climate plan.

The update and review work of the Climate Plan was carried out by a large Climate Coordination Group, which included over 80 experts from the City Group, research institutes, stakeholders and partners. The Climate and Environmental Policy Unit coordinated the work with additional support from outsourced experts. The Climate

Coordination Group is a significant gatherer of information and know-how, and therefore its activities have been continued even after the update work was completed to support climate work.

The Climate and Environment Policy Unit under the Mayor at the Central Administration with dedicated team of 10 persons is responsible for coordination of the climate work. In everyday work the team is supplemented by several decentralized experts in the fields of mobility, energy, finance, business, communications, EU policy, projects etc.

As outlined in the Mayor's programme 2021–2025, Turku will take and has successfully taken climate budgeting into use at the beginning of 2023. The climate targets have been taken into account especially in decision-making concerning land use, energy, construction and mobility and extensive training on EU taxonomy has been offered to these units. Where possible, the EU taxonomy will be taken into consideration when making investments, so that green funding can also be utilised. In investments and procurement, the City of Turku will seek to promote circular economy solutions and reduce consumption of natural resources.

Climate investments /climate budget is managed as part of the city's annual budget and planning. By 2029, the Turku Group will implement the largest investment program in its history (around two and a half billion euros), the effectiveness of which is crucial for the realization of carbon neutrality and the progress of the circular economy. In the Vähähiilinen kiertotalouskaupunki (VÄKI) project, climate budgeting is developed as a tool for the preparation, guidance and monitoring of the City Group's investment program, combining the implementation of climate goals and the circular economy.

The actions and investments of the city group will be updated annually as part of the yearly action and financial planning of the city. This process will utilize the regular administrative structures and processes of the city / city group governance plus will benefit from the support and insight from Climate Coordination Group.

The city has benefited from the shared European Covenant of Mayors methodology (member since 2010) and has more than halved the GHG emission from the level of 1990. The greenhouse gas emissions of Turku are calculated annually, using the local calculation method of the CO2 report, as part of the monitoring of the implementation of the city strategy and climate plan. The emissions are reported every other year to the shared European system using the SECAP method, where emission data based on the CO2 report is adjusted to meet the reporting requirements of the Covenant of Mayors. In line with the UN's requirements, the emissions are also reported annually through the global CDP (Disclosure Insight Action) system. The emissions calculation in Turku is in accordance with the UN global calculation protocol for cities.

Turku is the host for Union of the Baltic Cities Sustainable Cities Commission and active member in Eurocities and ICLEI (Mayor of Turku as Vice Chair of the European Regional Executive Committee and Vice-President in the global Presidium). Turku has been involved in city twinning projects within Europe and beyond, recently e.g. CoM Twinning Programme with Bologna, Green City Accord peer-learning programme with several European cities and IURC-EU-Japan cooperation with Nagano and Obuse. In addition, Turku has been involved in numerous international projects. Within country borders Turku is an active member in several networks, e.g. HINKU (<https://www.hiilineutraalisuomi.fi/en-US/Hinku>), FISU (https://www.fisunetwork.fi/en-US/About_Fisu) and Six largest cities in Finland -network (<https://6aika.fi/en/six-cities/>).

In the Ilmastokaupunki's Hiilineutraalit Klusterit project (IKLU), cluster-specific cooperation was developed to promote emission reductions and strengthen low-carbon business in the companies and value chains of the top Health, Maritime, and Experience clusters in the region. In the project, the actors of the clusters were brought together and in the project they jointly communicated the climate work of the cluster companies, such as Bayer's achievement of carbon neutrality in 2022, the production of the carbon-negative movie 'Odotus' (Waiting), and the goals of Meyer's Turku carbon-neutral shipyard and cruise ship.

In terms of the Turku City Group's own buildings, new and innovative energy solutions will be actively sought. The level of ambition for new solutions is very high, and innovative solutions for the identified challenges will be sought through collaboration and by piloting. For example, Turku Student Village will be turned into an energy positive pilot area by year 2025 with the help of the EU Horizon funded RESPONSE project.

Experience gained from the project's energy positive operating model will be utilised and applied, where possible, to other city districts in collaboration with the Turku City Group.

5.2 Module C-2 Social and Other Innovation Interventions

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

C.2.1: Enabling social innovation interventions					
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)
1.5 degree life campaign	The 1.5 degree life campaign is a climate campaign for the whole city. Turku wants to encourage citizens to shift towards sustainable 1.5 degree lifestyles and to invite other cities around the world to join.	City of Turku: Climate and Environmental Policy Unit	Citizens, communities, City Group, companies	City of Turku can reduce itself half of the region's emissions. The rest of the emission reductions will require efforts from businesses, communities and residents - as most of society's climate emissions come from living, food, transport and consumption.	The utility companies are also participating in Turku's 1,5 degree life campaign engaging citizens to lead sustainable lifestyles, offering various supporting services and knowledge. Also several other companies are participating in the campaign. More services (such as more efficient and sustainable energy, low carbon transportation options etc.) are offered to residents so that making the decision to live according to the 1.5 degree lifestyle

					becomes easier.,
1.5 degree city project	In the NetZeroCities Pilot Cities Programme, Turku implements the 1.5-Degree City -project. In practise, in the pilot Turku develops opportunities for residents to engage in climate work, supports companies' low-carbon business by continuing to develop the Climate Team, and creates a Climate Situation Room for Knowledge-Based Governance. In collaboration with the University of Turku's Department of Psychology behavioral science's know-how and "nudging" - method are applied to the work. The project encourages residents towards a climate-friendly life of 1.5 degrees with the help of dialogues, empowering climate-communication s campaign,	City of Turku: Climate and Environmental Policy Unit University of Turku: Department of Psychology	City of Turku, City Group, citizens, companies, University of Turku, political leaders	The project supports the goals of climate communication and engagement that are all part of Turku's climate plan to get everyone involved in climate work. It strives to enhance a cross-sectoral climate work where the City Group, companies and citizens come together to achieve a common goal of carbon neutrality. An online platform will be developed to display and monitor the climate work of the city group, companies, and citizens. Platform enables them to act in more systemic and cross-sectoral manner in climate work. Also, carbon footprint and handprint calculations are being developed and tested with companies and citizens.	Circular economy transition: Reaching carbon neutrality requires circular economy solutions. New solutions can be piloted with different stakeholders in co-operation. The approach of doing things together and participating through actions will also be applied to actions implementing circular economy and strengthening biodiversity. Circular economy generates wellbeing and new jobs in the Turku region and strengthens the local business, which operates in a way that is respectful of nature.

	and a network of climate ambassadors, which consists of various role models from Turku that residents can relate with. Also, sustainable free-time mobility will be piloted with citizens.				
Peer mentoring method	In the EU Horizon funded RESPONSE project the student village is turned into an energy positive district. One of the innovative element of the project is the peer mentoring method. It comprises of a training of a group of voluntary mentors, who are all also residents of the positive energy district (PED) area. The aim is to better reach residents, increase their awareness and bring forth their insight from their own perspective. As residents of the PED area, the peer mentors have first-hand experience of the life in the Student Village.	City of Turku, Turun ylioppilaskyläsäätiö (TYS), University of Turku, University of Applied Sciences, Turku Energia,	Students living in the campus area, partner companies, project partners, Fellow Cities	The concept of energy positive district (PED) may be new to many residents, and citizen engagement by mentoring makes it more comprehensible and accessible. When information travels from resident to resident, it is often easier to understand and accept. Residents learn new ways to save energy and new innovations ways to live more sustainably.	Circular economy transition: Reaching carbon neutrality requires circular economy solutions. New solutions can be piloted with different stakeholders in co-operation. The approach of doing things together and participating through actions will also be applied to actions implementing circular economy.

	...	...	...	...	...
	...	...	...	...	...

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

Turku implements continuous open climate action where the Turku City Group is constantly planning, implementing and monitoring climate measures. Collective climate action is actively open to climate measures of businesses and communities, involvement by citizens, and development of new solutions in collaboration. Also, as a central part of Circular Turku Roadmap (approved by the City Board on November 22, 2021), we aim to ensure an equitable transition by rethinking how goods and services are accessed in the city, offering new means for participation and collaborative governance as well as creating employment opportunities in new sectors in the city.

Climate communication will be a collaborative effort involving the Turku City Group and collaboration partners. The objective is to consolidate the story of Turku as a nature and climate city that combines climate and circular economy solutions. Different communication channels will be used in a varied ways to reach all target groups. In addition to our **Climate website** one example is the annual **Climate Forum**, with content such as: presenting the main results of climate action and new openings, acknowledging praiseworthy actions and operators. We also hold dialogues with different target groups and partners to investigate what kinds of activities, participation and communication they would like to see in climate, nature and circular economy work, and then plan the next steps and actions together.

Communication will also be actively delivered regionally, nationally and internationally in different networks, where experiences of climate work are shared and climate solutions are developed in collaboration.

The various target groups need to be provided with opportunities to participate in climate action, and we need to deliver communication that enhances participation. The climate plan is made available in both in Finnish and Swedish as well as in English. Turku also follows the European Accessibility Act so that digital services provided by the city would be easily accessible to all.

Opportunities to participate in climate action will involve the following:

Residents

- Encouraging residents to adopt a climate-friendly **1.5-degree lifestyle** and creating the prerequisites for it through the Turku City Group's own climate measures and communication. City also has in use **participatory platform** such as "voice your opinion" Voice Your Opinion - Kerrokantasi (turku.fi) and **participatory budgeting** to mention few.
- Using expertise in climate psychology to develop new and inspiring ways to participate in climate action, also taking into consideration the needs of different demographic groups.
- Delivering empowering climate communication, taking into consideration the needs that different demographic groups have in terms of information – in particular, we must take into account that children and adolescents have the right to receive information suitable for their age to alleviate climate anxiety.

Businesses and communities

- Encouraging businesses and communities to join collective climate action through their own climate measures. These are gathered and shared on a platform on the climate-themed Carbon Neutral Turku-webpages.
- Developing Turku Climate Team into a strong network that serves communities and businesses, implements and communicates climate, circular economy and nature measures and advances resource wisdom.

Personnel of the Turku City Group

- Communicating opportunities that staff and different units have in terms of climate actions and participating in climate work. Reinforcing ways to participate and creating prerequisites.
- Implementing and developing Eco-support activity to help turn collective climate and environment objectives into practice in everyday life at workplaces.

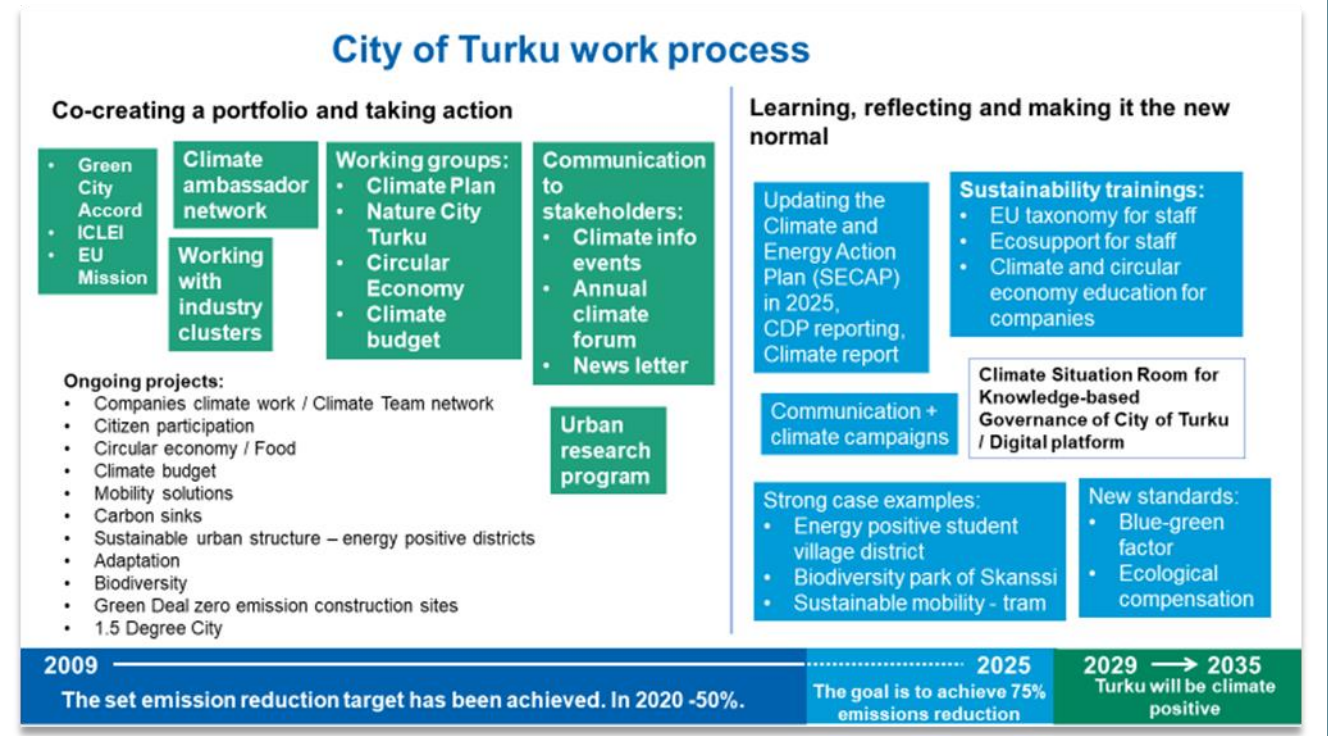
In the NetZeroCities Pilot Cities Programme, Turku implements the **1.5-Degree City -project**

The pilot strives to enhance a cross-sectoral climate work where the City Group, companies and citizens come together to achieve a common goal of carbon-neutrality. Goals of the project are to enable the needed systemic change triggering the development of technology, governance and policy, finance and business models. The city of Turku collaborates with the University of Turku to find science-based methods to accelerate climate neutrality through tested and innovative methods.

In practise, in the pilot Turku develops opportunities for residents to engage in climate work, supports companies' low-carbon business by continuing to develop the Climate Team, and creates a Climate Situation Room for Knowledge-Based Governance. The Climate Situation Room is an online platform that will display and monitor the climate work of the city group, companies, and citizens. Platform enables them to act in more systemic and cross-sectoral manner in climate work. Also, carbon footprint and handprint calculations are being developed and tested with companies and citizens.

In collaboration with the University of Turku's Department of Psychology behavioral science's know-how and "nudging" -method are applied to the work. The project encourages residents towards a climate-friendly life of 1.5 degrees with the help of dialogues, empowering climate-communications campaign, and a network of **climate ambassadors**, which consists of various role models from Turku that residents can relate with. Also, sustainable free-time mobility will be piloted with citizens. At the same time, the project supports the goals of climate communication and engagement that are all part of Turku's climate plan to get everyone involved in climate work.

Turku Student Village will be turned into an energy positive pilot area by year 2025 with the help of the EU Horizon funded RESPONSE project. Experience gained from the project's energy positive operating model will be utilised and applied, where possible, to other city districts in collaboration with the Turku City Group. One of the innovative elements applied in RESPONSE project is **peer mentoring method**. It comprises of a training of a group of voluntary mentors, who are all also residents of the positive energy district (PED) area. The aim is to better reach residents, increase their awareness and bring forth their insight from their own perspective. As residents of the PED area, the peer mentors have first-hand experience of the life in the Student Village.



5.3 Module C-3 Financing of Action Portfolio

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

C-3.1: Summary of interventions with cost implication (to be unpacked in Investment Plan)					
Action/ intervention name	Responsible entity and person	Start/end date	Field of action	Impact	Total cost estimated
<i>Development of the infrastructure network for walking and cycling</i>	As defined in the Turku Climate Plan 2029, paragraph 1.3 Implementation and monitoring	2023–2026	Transportation	42 kt CO ₂ -eq/year by 2030	206.8 M€
<i>Urban infill</i>		2023–2026			134.3 M€
<i>Electrification and other technical interventions</i>		2023–2026			12.0 M€
<i>Municipal buildings</i>		2023–2026	Built environment	158 kt CO ₂ -eq/year by 2030	215.2 M€
<i>Residential buildings</i>		2023–2026			418.7 M€
<i>Other buildings owned by subsidiaries</i>		2023–2026			144.3 M€
<i>Climate change adaptation investments</i>		2023–2026			132.0 M€
<i>Increase of renewable energy in district heat and cooling network</i>		2023–2026	Energy systems		21.0 M€
<i>Strengthening biodiversity and carbon sinks</i>		2023–2026	Green Infrastructure & Nature Based Solutions	16 kt CO ₂ -eq/year by 2030	5.0 M€
<i>Sustainable use and protection of water and marine resources</i>		2023–2026			19.0 M€
<i>Circular economy transition</i>		2023–2026	Waste and Circular Economy	4 kt CO ₂ -eq/year by 2030	18.0 M€
<i>Waste and pollution prevention</i>		2023–2026			61.0 M€

6 Outlook and next steps

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

Plans for next CCC and Action Plan iteration

The measures outlined in the climate plan are planned and implemented as part of the annual operating and financial planning and investment plans. The Turku City Group's actions have a significant role in the attainment of climate targets.

The attainment of the objectives set for 2025 and 2029 will be checked each council term in connection with the updating of the climate plan. The plan is updated when necessary, and the results are reported to the shared European system in line with SECAP monitoring.

A carbon-neutral Turku is a collective effort. Climate solutions are actively developed in collaboration with other municipalities, areas and partners in regional, national and international collaboration as well as in projects and networks.