

Carbon Neutral Turku 2029

**The City of Turku Climate Plan towards
the 2040s**

City Council 15 June 2026 § 122



The City of Turku is implementing the Climate Plan approved by the City Council in June 2018. The plan is updated every council term, with the most recent update approved on 15 June 2026. The plan defines the measures required to achieve the city's carbon neutrality target and it also encompasses both climate change mitigation and adaptation measures. The Climate Plan follows the European Union's common framework, SECAP (Sustainable Energy and Climate Action Plan).

**Carbon neutral Turku 2029. The City of Turku
Climate Plan towards the 2040s.**

Publisher: City of Turku.

Layout: KMG Turku

ISSN 2343-0710

ISBN 978-952-7503-21-8

Published: 06/2026

Contents

Collective climate action creates a sustainable future.....	5
1. Turku's strategic climate objectives	6
Policies guiding the City Strategy	6
Shared climate responsibility of European cities	6
Carbon Neutral Turku 2029.....	7
The targets of a climate-positive Turku towards the 2040s.....	8
Targets for climate change adaptation	8
Climate work creates vitality and strengthens the economy	9
A sustainable future for children and young people	10
Reducing energy and transport poverty	10
2. Climate Plan steering and implementation principles	12
Steering and monitoring of climate work in Turku City Group.....	12
Cooperation and partnerships are decisive	13
Climate and sustainability steering of investments and green financing.....	14
Shared climate responsibility and procurement	15
Targeting climate measures and themes	16
Guiding principles	17
3. Communication and participation	18
The story of a sustainable Turku	18
Developing communication and participation supports climate work	18
Guiding principles for communication and participation.....	19
Development targets.....	19
Measures	20
4. Evidencing progress and attainability of climate targets	23
Turku's emission targets	23
Emissions monitoring and reporting at the city level.....	23
Development of emissions 1990–2025.....	23
Emissions and sinks in the land use sector.....	26
Development paths to 2029, 2035 and 2040	26
Scenarios and attainability of the target	26
SECAP scenarios.....	30
Emissions from consumption	30
Adaptation status review	31
5. Carbon neutral and climate resilient energy.....	33
Overview of energy	33
The challenge of energy poverty.....	33
Guiding principles for energy development.....	34
Development targets.....	34
Energy measures	35

6. Sustainable low-carbon mobility	40
Overview of sustainable mobility	40
The challenge of transport poverty	40
Guiding principles for mobility-related climate measures.....	41
Development targets.....	41
Mobility measures	42
7. Sustainable urban structure and construction	48
Overview of sustainable city development	48
Regional cooperation is a challenge and an opportunity	49
Guiding principles	49
Development targets.....	49
Measures	50
8. Biodiversity and carbon sinks	55
Overview of nature targets and carbon sinks	55
Nature benefits and crossover effects	55
The challenge of carbon sinks	56
Guiding principles for strengthening biodiversity and carbon sinks.....	56
Development targets.....	56
Measures	57
9. Climate risk management and adaptation	61
Towards a climate resilient city	61
Guiding principles and adaptation targets.....	62
Assessment of risks and vulnerabilities	62
Adaptation measures and monitoring.....	66
10. Towards a resource-wise city.....	74
Annexes.....	75
1. Explanations of key concepts used in the Climate Plan.....	76
2. Climate Plan steering, participation and preparation group experts	81
3. Joint Statement of the Climate Partners of the City of Turku	85
4. Documents related to the Climate City Contract.....	86
5. Climate actions of Climate Team members	87
6. Climate risk cards	112
7. Source data for the Risk and Vulnerability Assessment	118
8. Description of emission calculation methods.....	119
9. Methodology for assessing the impacts of investments on the regional economy...	123
10. Energy and transport poverty	127
11. Description of scenario calculations.....	132
12. Adaptation Scoreboard data.....	133

Collective climate action creates a sustainable future

Turku has engaged in climate work in a long-term and productive manner. Emission reductions correspond to the targets set by the City Council, and emissions have already been reduced by 75% in comparison to the level of 1990. This development is in line with the principles of the Paris Agreement, and emissions per capita are also at quite a low level. Emission reductions have been achieved in all sectors, and the fastest progress has been made in reforming the energy system.

Climate work has also significantly strengthened and expanded: the city's organisation and personnel are committed to the targets, and the city has also built a strong group of climate partners who are committed to the common objectives. The city has started using climate and sustainability targets to steer Turku City Group investments and increased its efficiency in terms of utilising green financing. Climate change adaptation and the knowledge base for climate work have strengthened.

The updated climate plan identifies and responds to current challenges: adapting to the impacts of climate change, achieving carbon neutrality, reducing emissions from consumption, strengthening vitality and well-being, and ensuring a good life for future generations. Carbon neutrality requires a rapid reduction in emissions in all sectors – especially transport – and the offsetting of residual emissions by means of carbon sinks and other compensation measures. The focus in terms of influencing consumption emissions emphasises the overall significance of resource-wise operating methods.

Strengthening vitality and well-being requires a collaborative approach and safeguarding a good life through future-conscious management – together we will make Turku a place where sustainable activities are a natural part of everyday life and the operating environment supports the development of functional climate solutions to meet global needs.

The climate plan is a City Council-level steering document under the City Strategy, and all service entities and Turku City Group subsidiaries are responsible for its implementation. Steering and implementation are linked to annual operational and financial planning, investment programmes and Group steering, and impact is reinforced through Group-level climate and sustainability steering of investments and green financing.

Support for the knowledge base, evaluation and development is provided by a large group of climate work experts, which, in addition to Turku City Group experts, includes strong representation from higher education institutions in the region, research and development institutes and climate partner organisations. Turku's climate city contract and partnerships support implementation: the measures are not only based on the city's decisions – co-creation and partner actions also play a decisive role.

Turku's climate work combines ambitious targets, a just transition, strong steering of implementation and transparent monitoring that builds on current successes and responds to identified challenges. Climate work is open and inclusive – every person and organisation can be an important actor in ways that are suitable for their role.

1. Turku's strategic climate objectives

Policies guiding the City Strategy

The priorities set out in Turku's City Strategy guide the city's development and progress towards 2040. Managed growth, communal sustainability, good city life and climate and nature leadership are areas that reinforce each other. The city's vitality, appeal, economy, well-being and sustainable development go hand in hand. Turku wants to ensure high-quality services and a good everyday life and take care of people and the environment so that the city can continue to grow sustainably in the future.

According to the strategic objectives, in 2040 Turku will be recognised as a sustainable development pioneer and one of the world's leading climate and nature cities, which has achieved its ambitious climate and sustainability goals. Turku aims to grow sustainably and be carbon neutral in 2029 and a resource-wise city by 2040.

According to the city strategy, Turku is a city for children and young people that strengthens the well-being of those groups and ensures that every child and young person is seen and heard. The right of children, young people and future generations to a sustainable future is the most important goal of climate and sustainability work – and successful climate work is essential for a good future.

The strategy states that the objectives related to sustainable growth, a just transition, climate change

mitigation and adaptation as well as biodiversity are reconciled in Turku in cooperation with partners, stakeholders and residents. The climate, nature and resource wisdom goals are systematically implemented, and they are guided in more detail by the climate plan, as well as the roadmaps for a nature positive Turku and resource-wise circular economy. The city prepares for the impacts of global warming and extreme weather events.

The solutions are based on knowledge, and they simultaneously support the regional economy and the crisis resilience of society. Climate partnership utilises the expertise of companies, research and networks and develops new nature-based and circular economy solutions. Turku's climate and sustainability work is and has always been based on the best available scientifically researched information, strong cooperation, participation and partnership. The work has also sought and achieved diverse benefits related to the city's other strategic objectives.

Shared climate responsibility of European cities

The City of Turku climate plan implements climate policy that adheres to the Paris Agreement, aiming to limit global warming to a maximum of 1.5 degrees compared to pre-industrial times. Turku is an active and recognised climate actor as part of regional, national, European and international climate cooperation between cities, regions, states and civil society.

The Turku Climate Plan complies with the EU Covenant of Mayors model. In accordance with the model, Turku's climate targets are:



Reducing greenhouse gas emissions



Preparedness for climate change, adaptation and increasing resilience



Tackling energy poverty

Image 1. Comprehensive objectives of the Turku Climate Plan.

The City Council set the climate targets and approved the climate programme for the first time on 26 October 2009, and Turku joined the Covenant of Mayors, a shared climate action movement of European cities and regions, on 20 October 2010. The Covenant of Mayors provides cities and regions in the European Union with a shared climate work system, and it includes more than 11,000 local authorities. The European Commission is responsible for maintaining the system, in addition to supporting and steering climate action.

Turku is also active in the European Mission for 100 Climate-Neutral and Smart Cities, to which we joined by decision of the City Board on 7 December 2021, and cooperates with the Regional Council of Southwest Finland in the EU Mission on Adaptation. The mission work includes a climate city contract to strengthen partnership. Approximately 50 key businesses and communities in Turku as well as all the higher education institutions in the region have committed to the climate city contract. In addition to the commitments made by the city and its partners, the Climate City Contract includes action and investment plans that mainly focus on the Turku City Group's measures.

Turku's Climate Investment Plan for 2025–2030 complies with the EU Mission format, and it includes approximately 1.7 billion in city and Turku City Group investments to support the climate, nature and sustainability. The European Commission, European Investment Bank and other mission partners support the preparation of sustainable investments and financing opportunities. In addition to the European Commission, national ministries and programmes also support climate work and projects in mission cities.

Carbon Neutral Turku 2029

Turku City Council set city-level emission reduction targets and decided on the climate programme for the first time in 2009. The starting point and targets set were based on goals that were more ambitious than national and European targets, and they were also achieved ahead of schedule.

- The first city-level carbon neutrality target was set in 2014 as part of the city strategy, and the target year at that time was 2040.

Based on a global comparison made by Disclosure Insight Action (CDP) in 2015, the target was the sixth most ambitious city-level target in the world.

In the City Strategy adopted on 16 April 2018, City Council decided to bring Turku's city-level carbon neutrality target forward to 2029 and it also approved

a climate plan that follows the European Union's common model for climate work on 11 June 2018. The emission reduction targets were set, and a decision made to assess and update the Climate Plan for each council term and report annually.

- The target set for 2021 of reducing greenhouse gas emissions in the Turku region by at least 50% from the 1990 level was already achieved in 2020.
- Climate change adaptation has been a binding part of the Climate Plan with status equal to that of mitigation since 2018.

The Climate Plan was most recently assessed and updated in 2021–2022, and the Council approved the updated plan on 16 May 2022. That version set significantly stricter emission reduction targets for 2025 and 2029.

- The stricter target set for 2025 of reducing greenhouse gas emissions in the Turku region by at least 75% from the 1990 level was already achieved on schedule in 2025.
- In line with the current target, the aim is to reduce greenhouse gas emissions by at least 90% by 2029 in comparison to the 1990 baseline level.

In other words, the goal of a Carbon Neutral Turku 2029 has progressed very well so far. Turku has been successful in its efforts to reduce emissions, and it also clearly has the lowest greenhouse gas emissions per capita of Finland's large cities. Achieving the target will require further emission reductions in all sectors, especially transport. In addition, the remaining emissions must be absorbed by carbon sinks in the Turku region or offset by carbon sink actions and other compensation measures outside Turku.

It is possible to implement residual emission offsetting measures in a sufficient and cost-effective manner and simultaneously achieve significant benefits. In cooperation with municipalities aiming for carbon neutrality, the Finnish Environment Institute has specified principles and viable alternatives for implementing compensation.

- A more detailed plan for offsetting residual emissions will be prepared by June 2027 and implemented starting in autumn 2027. This plan will take into account the fact that measures to strengthen effective carbon sinks have already been implemented and are in progress.
- At the same time, concentrated efforts will be made to strengthen biodiversity and realise the goal of a nature positive Turku.

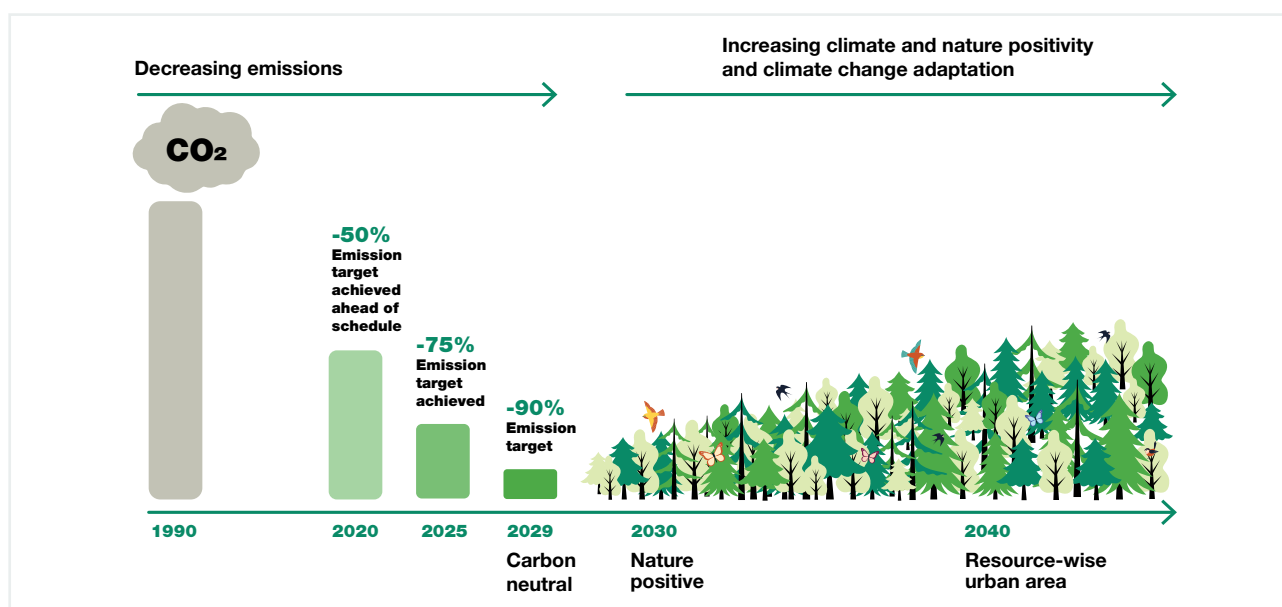


Image 2. The City of Turku's sustainability targets.

- The aim is to find and implement cost-effective methods of supplementing emission reductions in order to achieve carbon neutrality in 2029.

The targets of a climate-positive Turku towards the 2040s

After achieving carbon neutrality, Turku will aim for increasing climate positivity. In a climate-positive Turku 2030, total emissions and especially emissions per capita will continue to decrease.

- By 2040, emissions in the area will be cut in half from the 2029 level.
- Residual emissions are increasingly absorbed by natural carbon sinks in the Turku region and offset with other suitable methods (see above).

The Finnish Environment Institute's guidelines/recommendations for carbon neutral municipalities (Finnish Environment Institute 2025 and possible updates) and the principles and guidelines of the European Union Mission on 100 Carbon neutral and Smart Cities and the EU Covenant of Mayors (European Commission, DG JRC 2025 and possible updates) are applied when defining carbon neutrality. The aim is to utilize carbon sink units certified in accordance with the principles of the EU Cities Mission as climate units.

Reaching the target of the Paris Agreement also requires a significant reduction in consumption-related emissions: a city that promotes the 1.5-degree lifestyle, where sustainable choices are possible and natural.

In addition to reducing emissions in the Turku region, we also aim to reduce consumption-related emissions outside the area. This work utilises the methods and monitoring of the FISU network of resource-wise municipalities (Finnish Sustainable Communities). The targets for reducing Turku's consumption-based emissions are:

- In 2026–2035, Turku's consumption-based carbon footprint will decrease significantly to half of the 2005 level.
- By 2040, the consumption-based carbon footprint will decrease by 70% from the 2005 level.

While working to reduce emissions, Turku is preparing for climate change as comprehensively as possible, and the city will be developed to be more change-resilient.

In order to strengthen the broader impact of climate work, Turku's climate handprint will be increased by creating an operating environment for businesses that supports climate positivity, by promoting the decoupling of economic growth and emissions development in the region, and by cooperating to ensure that the education and research activities of Turku's higher education institutions and educational institutions support the realisation of climate positivity and increasing the handprint.

Targets for climate change adaptation

Turku strives to be a climate resilient city that safeguards the well-being of its residents, biodiversity, livelihoods and crisis preparedness in changing

climate conditions and during sudden changes in weather conditions. The City of Turku's adaptation targets are based on the principles of the United Nations (UN) Sendai Framework for Disaster Risk Reduction.

- The City of Turku systematically develops the identification, assessment and monitoring of climate risks. Regional risks and vulnerabilities are identified and taken into account in proactive preparedness, decision-making and planning.
- Climate risk management is strengthened by integrating adaptation work into strategic management, financial planning and operative activities in a cross-cutting manner. Turku is a stable, long-term and reliable partner.
- Climate resilience and resilience in the region will be strengthened by taking preparedness for climate risks into account in all investments. Ensuring the safety of the operating environment will improve the vitality of the region and its socio-economic and environmental conditions.
- The city's disaster preparedness will improve through close cooperation with residents, businesses, communities and authorities. Jointly developed operating models will improve the city's ability to prevent and recover from disruptions.

Climate work creates vitality and strengthens the economy

Investments that mitigate climate change and improve sustainability as well as the development of solutions and business activities play an important role in the region's economy.

As part of the preparing the Climate Plan, regional economic reviews of investments made in Turku related to the energy transition and to public transport and pedestrian and bicycle traffic were carried out. The reviews revealed that these investments have brought significant benefits to the region's economy (Table 1). The investments had impacts on employment in the region, the value added produced in the regional economy, the production impact related to investments, and revenue from municipal and corporate income taxes. The reviews were performed with the same methods as those used to evaluate national climate and energy measures. The method used is described in Annex 9.

Turku implements strong climate policy and seeks to be an internationally acknowledged and well-known pioneer and developer of sustainable solutions and expertise. The impact of Turku and actors in the region on climate change mitigation exceeds their size and they also provide expertise and solutions to meet needs in other regions.

- Turku's positive carbon handprint is significant and is systematically increased in cooperation with civil society, education and innovation actors, companies and development partners in the region.

Higher education institutions, companies, communities and residents in the region are strongly involved in creating and implementing climate solutions both locally and internationally.

- Turku strengthens the regional, national and global impacts of its activities by focusing effective climate measures on investments and procurement, strongly emphasising the climate perspective in the region's education,

Table 1. Climate investments in Turku strengthen the regional economy. The table describes the estimated impacts that climate investments affecting Turku's emission trends have on turnover, value added, employment and municipal and corporate income tax revenue in the region. The results show that investments related to climate work are not only emission reduction measures but can simultaneously strengthen local business life, employment and the tax base. Investments in district heating production produce the largest impacts, but smaller investments in transport and heating also produce positive regional economic impacts.

	Investment in the region (EUR million)	Revenue (EUR million)	Value added (EUR million)	Employment (person-years)	Municipal and corporate income taxes (EUR million)
District heating	259,5	498,5	201,9	1924,6	8,65
Replacement of oil heating	30,7	56,9	23,9	242,7	0,82
Bus lines	8,5	16,7	6,5	51,5	0,19
Walking and cycling routes	7,8	15,5	5,9	46,8	0,17

and encouraging companies in the region to engage in responsible research, development and innovation activities (RDI) and sustainable procurement.

A resource-wise circular economy in line with the City Strategy creates well-being and new jobs in the Turku region and sustainably strengthens the regional economy, which operates with respect for nature. The sustainability transition creates an opportunity for Turku to increase the competitiveness of the region, especially in areas where the city and urban region have strong expertise, business activities, research and education. This simultaneously strengthens the ability of companies to respond to increasingly strict climate and environmental steering, the changing demands of customers and financial markets and the pressures of international competition.

A sustainable future for children and young people

The right of children, young people and future generations to a sustainable future is the most important goal of climate and sustainability work. Turku's climate work pays particular attention to the future of children and young people as well as strengthening agency, hope and resilience and creating sustainable vitality in the region.

- Through its climate work, Turku strives to strengthen the participation and meaningful agency of children and young people, alleviate climate and environmental anxiety, safeguard the conditions for a good life, and create protection against the impacts of climate change.
- Another aim is to respond to the needs of children and young people by actively producing and communicating information about the impacts of climate change and sustainable climate solutions, with consideration to the needs of different target and age groups.
- The forms of participation in climate work are planned and implemented so that children and young people can participate and actively contribute to creating a climate resilient Turku.
- Young people's sustainable development competence is actively strengthened and career opportunities related to sustainable solutions are created together with higher education institutions, companies and communities in the region.

In accordance with the Turku City Strategy, the objectives related to a just transition, sustainable growth, climate change mitigation, adaptation and

biodiversity will be coordinated in cooperation with partners, stakeholders and residents.

- Turku's climate targets are implemented in a fair, inclusive, transparent and sustainable manner so that every Turku resident has the opportunity to enjoy the benefits of climate work and also protect themselves from the harmful effects of climate change.

Reducing energy and transport poverty

The European Union's shared targets state that a just transition to a climate resilient economy will be implemented in a way that ensures no one is left behind and supports vulnerable groups.

In accordance with the EU Covenant of Mayors, the Turku Climate Plan sets a target for reducing energy poverty. In Turku, energy poverty means a combination of high energy costs and low income. Transport poverty describes a high-cost burden and a lack of transport options that provide an alternative to private car use.

Turku aims to reduce energy poverty through its own actions and in cooperation with the Government and other partners:

- By 2029, energy poverty in Turku will be reduced so that the share of energy-poor households decreases from the current 5.5% to 4.0%.
- By 2040, the aim is to reduce the share of energy-poor households to as close to zero as possible.

Turku strives to actively reduce transport poverty by improving the affordability and accessibility of essential mobility, especially for vulnerable households.

Turku aims to reduce transport poverty through its own actions and in cooperation with the Government and other partners:

- By 2029, transport poverty in Turku will be reduced so that the share of transport-poor households decreases from the current 4.5% to 4.0%.
- By 2040, the aim is to reduce the share of transport-poor households to half of the current level.



2. Climate Plan steering and implementation principles

Steering and monitoring of climate work in Turku City Group

The City of Turku Climate Plan is a strategy-level guidance document that is specified in the City Strategy and the Mayor's Programme. Decisions on the document are made by the City Council. By joining the European Covenant of Mayors for Climate and Energy in October 2010, the city committed to long-term climate work in line with common European principles.

- The City Council receives annual reports on the implementation of climate targets and plans.
- The climate report contains information on emissions and carbon balance as well as an assessment of progress related to adaptation. It also provides an overall picture of the progress and impact of climate work as well as challenges and new initiatives.
- In connection with the report, the implementation of the measures is monitored and evaluated annually and, if necessary, the measures are also updated.
- The situational picture concerning the progress of climate work is shared and communicated through the annual Climate Forum.
- Annual reports are also submitted to the global CDP-ICLEI climate reporting system.

In accordance with the European Union's common model (Covenant of Mayors), the targets and content of the Climate Plan will be assessed and reviewed in more detail for each council term.

- In connection with updating the Climate Plan, the achievement of the targets (2021)-2025-2029-(2035-2040) will be monitored and the plan updated for each council term.
- At the same time, a report on the results and implementation and the updated Climate Plan will be submitted for evaluation to the Covenant of Mayors / DG JRC.

In accordance with the administrative regulations, the City Board is responsible for steering climate and environmental policy.

- When necessary, proposals and monitoring information related to the implementation and development of the Climate Plan are submitted to the City Board and/or its sections for processing.

The task of the Collaborative Leadership Group for Environment (City Board 8.9.2025 § 307) is to create a common situational picture and strengthen collaborative preparation related to a city for the climate and nature in line with the Mayor's Programme.

- The leadership group deals with climate, nature and circular economy entities in addition to preparing, implementing and reporting on the Climate Plan.

The Climate, Nature and Circular Economy area of responsibility, which is part of the Service Division of Business and Economic Development operating under the City Board, is responsible for steering and promoting climate, energy and environmental policy in the Turku City Group and resource wisdom and the circular economy in cooperation with partners and stakeholders.

- Sufficient resources for steering and preparing the Climate Plan have been allocated to the area of responsibility.

All the city's service divisions and Turku City Group subsidiaries implement the Climate Plan. The aim in implementation and steering is to strengthen collaboration so that all actors can find their own role and see the significance of their work as part of the whole process. This simultaneously strengthens and highlights the benefits of climate work for the city's other key strategic objectives.

The preparation and implementation of the climate change plan is, and has been, discussed and processed in the steering groups of all service divisions and at joint events involving Turku City Group subsidiaries.

- The persons responsible for the service divisions and Turku City Group subsidiaries have actively taken part in preparation of the Climate Plan and the planning of measures and participate in its implementation.



Image 3. Climate work creates vitality and innovations in the Turku region.

- Measures in accordance with the Climate Plan are planned and implemented as part of annual operational and financial planning as well as investment programmes and development projects.

Cooperation and partnerships are decisive

The measures taken by Turku City Group play a decisive role in the implementation of climate targets, but they will not be realised without broad participation, investments and co-creation. Cooperation is also the best way to create and strengthen the knowledge base needed for climate work.

Working together will make Turku a leading climate city – and this will also support the development of climate work done by other cities and partners.

- A large group of climate work experts – which includes representatives from Turku City Group and from higher education institutions, research and development organisations and Turku's climate partners – provides expert support for developing climate work and strengthens the joint benefits (Annex 2).
- Climate solutions are actively developed with other municipalities, regions and partners of higher education institutions in regional, national and international cooperation as well as in projects and networks.

Turku makes effective use of the European Union Mission on 100 Carbon-neutral and Smart Cities, which provides a strong support structure and development network for climate and sustainability work.

- Approximately 50 key companies and communities in the region, including all higher education institutions, have been invited to and joined the Turku's Climate City Contract, which is part of the mission. The partners are committed to supporting and promoting the climate targets and working together (Annexes 3 and 4).
- The Climate City Contract also includes an action and investment plan. Turku's investment plan includes EUR 1.7 billion in investments that support the climate, nature and sustainability in 2025–2030. (Annex 4)
- The European Commission has approved the Turku Climate City Contract and Plan package and granted Turku the EU Mission Label status in March 2024. This provides access to expert support, project financing, support for preparing green financing and full participation in the mission cities network.

In terms of the impact of climate work and opportunities for participation, it is important to ensure that smaller companies and communities can also participate in joint climate targets and measures alongside larger ones.

- The Turku Climate Team launched in 2019 is open to all companies and communities that are implementing climate actions with an impact as part of their own activities and want to promote a Carbon neutral Turku in cooperation.
- Participation is based on climate, nature and/or circular economy actions with impact, which are presented and evaluated at the time of joining and linked to a common database (Annex 5).

Climate and sustainability steering of investments and green financing

Turku is in a significant phase of city growth, and Turku City Group is investing heavily in creating the conditions for growth. The growth phase and related investments create a good opportunity to develop a climate resilient and low-carbon city, where growth is also sustainable and guided wisely in terms of biodiversity and resource use.

- In order to strengthen the climate impact and resource wisdom of Turku City Group's investments, Turku developed and introduced comprehensive Group-level climate and sustainability steering during the 2021–2025 council term.
- The operating model was established from 2025 onwards (Chief of Staff 28.4.2025), and its impact on climate and sustainability funding will also be strengthened as part of the implementation of the Mayor's Programme (City Council 9.6.2025).

The climate and sustainability budgeting included in Turku City Group's financial control and action plan strengthens the sustainability steering of the city's investments and promotes sustainable resource use, the green transition and the utilisation of green financing.

- In 2025–2030, Turku City Group will implement investments totalling approximately EUR 1.7 billion that support climate, nature and sustainability targets.
- The EU Taxonomy of Sustainable Financing is applied when assessing the sustainability of investments.
- All Turku City Group investments of more than EUR 1 million are within the scope of taxonomy assessment and aim to meet the criteria.
- The areas taken into account during the review are climate change mitigation, climate change adaptation, the circular economy, impacts on nature and water systems, and environmental pollution.

The EU taxonomy allows for a comprehensive review of environmental objectives and more efficient use of green financing. Green financing enables significant economic benefits for projects.

- The utilisation of green financing will be strengthened, and the eligibility of Turku's investment projects for green financing will be actively developed in cooperation inside the City Group,

Climate partners are committed to supporting the City of Turku's carbon neutrality target



Photo: Turku's climate partners at the Mayor's Climate Meeting on 8 April 2026.



Photo: Meyer Turku

Climate partner Meyer Turku has developed a net zero cruise ship concept and is striving for net-zero emissions at the shipyard by 2030.

Image 4. Turku's climate partners.

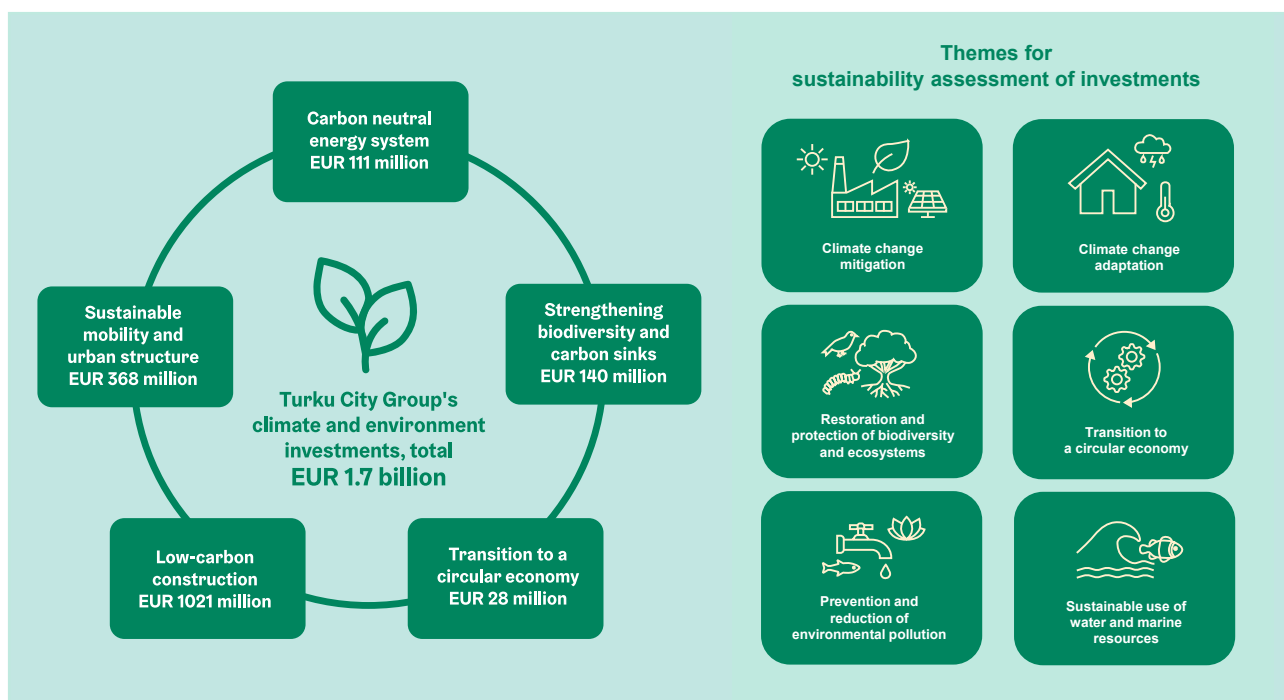


Image 5. Climate and sustainability assessment guides Turku City Group's investments to support climate and environmental targets.

as well as with funding partners such as the European Investment Bank, the Nordic Investment Bank and Municipality Finance (MuniFin).

Shared climate responsibility and procurement

The Climate Plan is steered and implemented in a collaborative manner that takes into account the targets for sustainable growth and the economy, well-being, a good city life and the vitality of the region. The measures strive to promote several targets simultaneously and avoid unfavourable impacts. As part of implementation of the Climate Plan, joint climate and sustainability responsibility will be developed and put into practice throughout the organisation.

- The impact on climate, nature and resource wisdom targets will be taken into account at all organisational levels as part of basic activities, procurement and investments.
- Whenever possible, innovative and effective climate, nature and resource wisdom actions are actively planned and implemented throughout the organisation in ways that are suitable for the core tasks in each area.
- Personnel training will be directed and strengthened to support climate responsibility in Turku City Group and to promote an operating culture that supports climate and nature positivity.

- The city's meal services (including schools, day-care centres and lunch restaurants) and catering will emphasise low-emission ecological and plant-based products and minimise food waste.

Procurements will be a particular priority, as they can also have a significant impact on consumption-based greenhouse gas emissions and implementing the principles of resource wisdom. The city's procurement strategy will guide the implementation of measures that support achievement of the Climate Plan targets and the transition to carbon-neutral procurement.

- Procurement principles and practices as well as the focus areas of procurement will contribute to reducing the carbon footprint and impacts of procurement on nature and to disseminating circular economy solutions.
- Proactive communication and interaction with the market about how the Climate Plan will affect future procurement will be increased, for instance, by organising market dialogues.
- Procurement will be steered and implemented so that it promotes the development of climate business and innovations.
- Regional collaboration in procurement and competitive tendering will be strengthened in order to increase the impact of the Climate Plan.

- The criteria for food and meal procurement will be developed to promote increased use of low-emission ecological and plant-based ingredients produced in a sustainable manner.

The climate impact of procurement will be ensured through sufficient support, monitoring, control and reviewing. Sufficient resources will be allocated for these functions.

Targeting climate measures and themes

In contrast to the updated Climate Plans approved in 2022, implementation of Turku City Group's climate responsibility by focusing on influencing procurements and investments has already been presented above as part of the Climate Plan steering and implementation principles (and not as a separate chapter under mitigation measures).

Preparation of the Climate Plan included the application of guiding principles that were specific to each theme and defining area-specific objectives and measures that affect climate change mitigation by reducing emissions in Turku and elsewhere, improve the ability of the urban area and the population to tolerate the impacts of climate change, and strengthen competence, agency, participation and functional capacity. The theme chapters of the plan include more detailed information about the measures.

The application of guiding principles by theme and the preparation, specification and presenta-

tion of objectives and measures by area are part of the European Union's common model for climate work in cities and regions (Covenant of Mayors). In accordance with the model, the Climate Plan must also demonstrate that the set climate targets are attainable in order to prove that the sub-targets and measures actually lead to the achievement of climate targets.

To achieve climate objectives in an organised and understandable manner, climate measures are divided into the following themes:

- Strengthening communication and participation to support the knowledge base, agency and resilience;
- Developing a carbon neutral and sustainable energy system;
- Low-carbon sustainable mobility;
- Sustainable community structure and low-carbon construction
- Strengthening biodiversity and carbon sinks, developing and implementing offsetting measures;
- Managing and adapting to climate risks.

The Climate Plan measures were compiled through collaboration involving a large expert group consisting of key persons from the city, Turku City Group and partners (Annex 2). Some of the measures are in

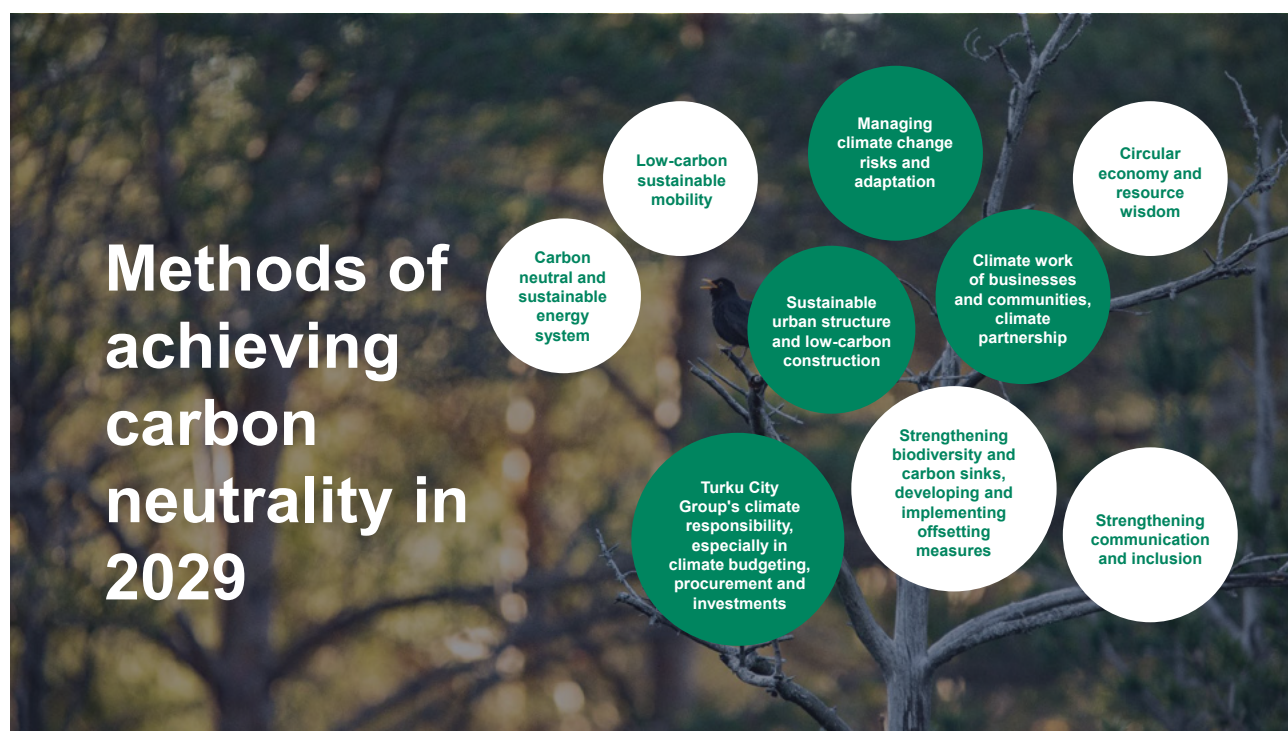


Image 6. Turku's climate work areas.

progress and some are continuous by nature. There are also new measures and ongoing measures that have undergone further development or still require development. In accordance with the model for continuous development of climate action developed and applied by the City of Turku to implement its climate work, measures are continuously being examined, prepared, introduced, evaluated and further developed.

The measures presented in the tables for different areas of climate work have a significant impact on

climate targets, but the list of measures is always subject to continuous updating and steering. The measures as a whole are not approved by a single decision but are managed through annual steering, investment plans, Group steering, development projects and cooperation.

In addition to Turku City Group's measures, Turku's climate partners (approximately 50) and Climate Team member communities (approximately 150) implement their own effective climate measures and promote Turku's shared climate objectives.

Guiding principles

The implementation of the Climate Plan and the development of different approaches and measures in all climate plan areas are guided by the principles derived from the strategic objectives of the City Strategy and Climate Plan presented above. The principles are applied and supplemented to suit different themes, situations and circumstances.

1. Knowledge-based approach and continuous development

Decisions and measures are based on science, the best available researched information and multidisciplinary examination, impact is monitored, the approaches and measures are continuously developed and improved.

2. Cooperation and collaboration

The climate plan is implemented and climate work carried out with residents, companies, communities, higher education institutions and networks. Other strategic objectives of the city are also actively influenced, and productive climate work is promoted regionally, nationally and internationally.

3. Equity, participation and agency

Climate solutions support well-being and health and create a sustainable everyday life and future. They safeguard the right of children, young people and future generations to a good life. The solutions must be fair in terms of their impacts and take those in a vulnerable position into account. Climate work and communication strengthen everyone's agency and participation, increase accessibility to researched information and create constructive dialogue.

4. Nature positivity and strengthening carbon sinks

Biodiversity is promoted in all areas (such as energy, mobility, construction, land use), carbon sinks are increased and actions taken to avoid their decline.

5. Resource wisdom and life cycle thinking

Climate work supports the objectives of resource wisdom in line with the City Strategy and applies and strengthens the circular economy. The impact of the solutions is taken into account and costs estimated over the entire life cycle.

6. Vitality and well-being

Climate solutions and the cooperation associated with them strengthen the vitality, appeal and retention in the Turku region as well as the economy and employment in the region. Joint climate work strengthens the opportunities for companies in the region to grow, renew and succeed, and to ensure their profitability and competitiveness in a changing operating environment.

7. Resilience, risk management and future sustainability

Proactive preparation for the impacts of climate change takes place in all planning and maintenance, vulnerability is reduced and the conditions for a good city life ensured for future generations. The link between the climate measures and crisis resilience and security will be strengthened and highlighted.

3. Communication and participation

The story of a sustainable Turku

The City of Turku aims to be a pioneer in sustainable development by 2040 and one of the world's leading climate and nature cities, and it needs everyone's efforts to achieve that goal. Turku encourages residents towards a sustainable life where everyday choices are made within the limits of the carrying capacity of the climate and nature. However, responsibility does not only lie with the individual, and the city offers solutions for a more environmentally friendly life, for example by developing low-carbon mobility, sustainable services and housing solutions.

Creating and telling a shared story requires that the entire city organisation as well as companies, communities and residents in the region are aware of the climate and nature targets and the measures required to achieve them. It is essential to strengthen the belief that these goals are achievable and that everyone has the opportunity to be part of the change. The change also requires the development of different forms of participation.

In terms of the acceptability, communication plays a key role in creating a common understanding of why the measures are being implemented. Commu-

nication also has to increase confidence in achieving the common goal and highlight, for example, the diverse benefits of climate work for the well-being of residents, nature, and the city's livability and vitality. Instead of problems, communication should focus on an action-oriented approach, explain what residents can do and show what kind of sustainability work is being done by the city. The sustainability transition* requires broad participation from different stakeholders. Communication and participation support the achievement of these objectives and the acceptability of the measures.

**Sustainability transition is a broad societal change that involves changes in societal systems – such as energy production, the economy, the food system and mobility – so that they correspond to the carrying capacity of the environment. The aim is to mitigate climate change, halt nature loss and safeguard well-being in an ecologically and socially sustainable manner. Source: Primmer, E. et al. 2021. It is time for sustainability transformation. Finnish Environment Institute (SYKE), Policy Brief 9.12.2021.*

Developing communication and participation supports climate work

The sustainability transition requires a change in ways of thinking and everyday choices, which is why it is important to strengthen city residents' agency regarding climate work. Clear, inclusive and meaningful communication supports sustainable choices and a change in behaviour in city residents. Climate measures are more effective and sustainable when the needs of different population groups are taken into account and opportunities for participation are equal.

A reliable and understandable knowledge base is also a prerequisite for a sustainability transition. Climate disinformation, which means intentionally disseminated false or misleading information about climate change, is a constantly evolving threat. As a result, researched information should be emphasised in climate communication. The city must support media literacy and critical thinking skills in all age groups.

Empowering communication supports climate agency by making the solutions, successes and people's opportunities to exert influence visible. It increases hope, strengthens the sense of capability and helps people commit to everyday choices that support the climate (Image 9).

What kind of actor am I in climate work?

What do I want to be like?



At work



At home



**As a coworker,
manager**



**During
leisure time
and hobbies**

Image 7. It is important for everyone to recognise their role in climate work and how they can participate in achieving the carbon neutrality target.

How to spot climate disinformation?



Tip 1.

Get the full story



Tip 2.

Watch out for fake experts



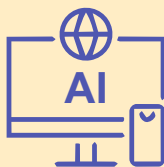
Tip 3.

Resist emotional traps



Tip 4.

No quick fix for climate change



Tip 5.

Watch out for AI-made fakes

Source: Climate disinformation - Climate Action - European commission

Guiding principles for communication and participation

1. Understandable communication based on researched information

The city communicates about its climate work in a clear and concrete manner on the basis of researched information. Communication highlights the multiple benefits of climate measures in Turku, such as impacts on health, the economy, well-being and the living environment.

2. A shared story of a climate and nature city

Communication is implemented in close cooperation with Turku City Group and its partners. It strengthens a shared story of the city as a climate and nature city that also promotes circular economy solutions. Methods used in creative sectors and art are also used to build the shared story.

3. Communication and participation are implemented equitably

Communication and participation ensure that all Turku residents have the opportunity to benefit from climate work and protect themselves from the harmful effects of climate change, with particular attention to vulnerable groups.

4. Target group-oriented and multi-channel communication

Communications are implemented through multiple channels with consideration to the needs of different target groups to ensure that the content and importance of climate work reach city residents and stakeholders as extensively as possible.

5. Open cooperation and a networked operating method

Climate communication and work to strengthen participation are implemented openly in cooperation with higher education institutions, companies, communities and various networks in the region at the local, regional, national and international level.

Development targets

Shared city story of climate work

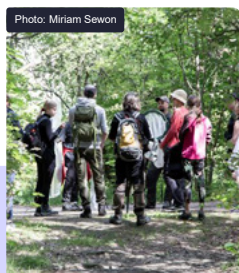
Climate work will create a shared story that is visible in the communication of Turku City Group, companies, higher education institutions and communities, and it will reinforce the city's identity as a climate and nature city while also emphasising circular economy solutions.

Image 8. How climate disinformation is detected.

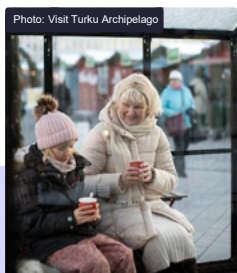
The prerequisites for successful climate work are participation, equity and clear communication.



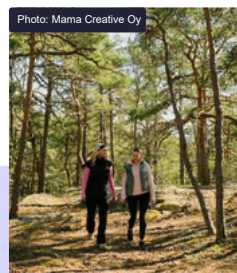
Communication and public discussion have an impact on the progress of climate measures.



Participation strengthens the success of climate measures.



Equity and inclusion are prerequisites for ambitious climate work.



Climate communications and climate literacy enable behavioural change.

Kuva 9. IPCC:n vuonna 2023 julkaistun [Synthesis Report](#) (AR6) published in 2023, participation, equity and clear communication are key prerequisites for successful climate action.

A city that is known for effective climate communication

The city will be a nationally recognised pioneer in climate communication, combining research data, clear communication and meaningful examples at the city level. Communication is empowering and takes into consideration the information needs of different target groups.

A reliable source of climate information

The city will be a reliable source of climate information and strengthen residents' ability to identify reliable information and ignore false climate information.

Strengthening opportunities for participation in climate work by creating new methods and developing existing ones

Different target groups will be active in climate work. An increasing number of city residents will feel that they can influence climate work and participate actively in developing and implementing climate solutions. The partner network of companies and Climate Team will create more climate solutions. The city personnel will know their role in climate work and be active in promoting climate communication and participation.

Measures

The measures targeting communication and participation were compiled through collaboration involving a large expert group consisting of key persons from the city, Turku City Group and partners. Some of the measures are in progress and some are continuous by nature. There are also new measures and ongoing measures that have undergone further development

or still require development. In accordance with the continuous improvement model for climate action developed and applied by the City of Turku to implement its climate work, measures are continuously being examined, prepared, introduced, evaluated and further developed.

The measures presented in the table have a significant impact on communication and participation targets, but the list is subject to continuous updating and steering. The measures as a whole are not approved by a single decision but are managed through annual steering, investment plans, Group steering, development projects and cooperation.

Measures: Communication and participation	Responsible parties City of Turku and other actors
COMMUNICATION	
Understanding of a just transition will be increased and information about its impacts, opportunities and fair solutions communicated to different target groups in an accessible and multi-channel manner.	Climate, nature and circular economy, Communication Marketing Services
Annual communication about the progress of climate, nature and circular economy work will be carried out in a visible, effective and truthful manner to residents, decision-makers and other stakeholders.	Climate, nature and circular economy, Central administration, Communication and marketing services
An annual Turku Climate Forum that is open to everyone will be arranged and stakeholders invited to participate. The event will include a situational review of current themes in the city's climate work.	Climate, nature and circular economy
Interactive communication will be implemented in cooperation with different stakeholders, especially joint communication campaigns with Turku's climate partners.	Climate, nature and circular economy
Climate communication and participation will be strengthened openly and in cooperation with different networks at the local, regional, national and international level. The partners include higher education institutions, business partners and city networks.	Climate, nature and circular economy
The progress, benefits and challenges of climate work will be highlighted at the local and national level. This will utilise local media in particular.	Climate, nature and circular economy, Bauer Media
The city will cooperate with schools and day-care centres. Empowering climate communication will be implemented for children and young people, taking age-appropriate information needs into account.	Service Division of Children and Young People
The availability of reliable climate and nature information will be improved and made more understandable.	Climate, nature and circular economy, Communication and Marketing Services

PARTICIPATION	
Climate and nature cooperation between companies will be developed. The Climate Team and partner network will be utilised to accelerate the climate, nature and circular economy solutions of businesses and actors in the region.	Climate, nature and circular economy
The capabilities and opportunities for children and young people and vulnerable people to participate in climate and nature work will be increased.	Service Division of Children and Young People, Youth Work, Climate, nature and circular economy
The personnel's climate and nature competence and capabilities will be strengthened as part of the city's core task and decision-making. The role of personnel as implementers of climate and nature work and enablers of change in their own work will be supported.	Climate, nature and circular economy, Environmental Protection
Climate and nature themes will be more strongly included in the city's financing mechanisms, such as grants and participatory budgeting.	Climate, nature and circular economy
Dialogue between businesses, residents, students, city employees and decision-makers will be strengthened.	Climate, nature and circular economy, higher education institutions in the region, climate partner network
The city will strengthen fair climate and nature participation by developing cooperation with higher education institutions, businesses, organisations and other stakeholders.	Climate, nature and circular economy, higher education institutions in the region, climate partner network

4. Evidencing progress and attainability of climate targets

Turku's emission targets

Turku achieved the emission targets set by the City Council for 2021 and 2025. The targets were a 50% emission reduction in 2021 and a 75% reduction in 2025 compared to the level in 1990.

- By 2029, Turku is aiming for carbon neutrality and a 90% reduction in greenhouse gas emissions in the territory compared to the level in 1990.

Carbon neutrality has been defined in a way that the remaining emissions of the area are absorbed by carbon sinks in the territory or offset by carbon removals and other compensation measures outside Turku.

- From 2030 onwards, the goal is to strengthen climate positivity towards 2035 and 2040

Emissions monitoring and reporting at the city level

The base year (baseline) for Turku's climate targets is 1990, in accordance with the objectives defined in international climate policy and the national Climate Act.

Community-scale approach is used to define carbon neutrality and calculate the emissions of cities and states. Monitoring of greenhouse gas emissions in the Turku region is performed annually by means of municipal emissions calculations carried out by the Finnish Environment Institute in accordance with the Climate Act, and coordinated with Finland's national emissions monitoring (Annex 8). The CO₂ report produced by the Sitowise consulting agency was also previously used in the monitoring.

Monitoring data is reported annually to the City Council and the public as well as to the global climate and environmental responsibility monitoring system (CDP and ICLEI).

The SECAP emissions calculation that complies with EU requirements is also based on the ALAS calculation system specified in the Climate Act and implemented by the Finnish Environment Institute. It takes into account Turku City Group's own energy production and consumption, ownerships and their development in a more detailed manner as well as other more specific information in accordance with EU guidelines.

Emissions data are reported to the European Commission by council term in accordance with the Covenant of Mayors. The reporting was performed in 2015 and 2020. The data for 2025 will be reported in the context of this Climate Plan and the next reporting will apply to 2029. The Climate Plan also presents emission scenarios until 2040. The scenarios make it possible to examine the achievement of the set targets.

Monitoring of emissions and sinks in the land use sector complements the situational picture of carbon neutrality at both the city and state level. Calculation in the land use sector was performed in cooperation with the Finnish Environment Institute. Calculation and the defining of carbon offsets in the land use sector will be developed in cooperation, and in line with international specifications.

Turku has been actively involved in developing and also implementing the monitoring of consumption-based emissions (carbon footprint). Consumption-based emissions include all life cycle emissions – in the region, elsewhere in Finland and abroad – generated in the production of commodities used in the Turku region.

Monitoring of consumption-based emissions includes greenhouse gas emissions caused by household consumption in the region, public procurement and investments. Monitoring will be further developed and implemented on the basis of joint data and calculations from FISU municipalities produced by the Finnish Environment Institute and the Kulma calculation model for consumption-based emissions developed in a joint project involving municipalities and expert organisations.

Development of emissions 1990–2025

Turku achieved – and exceeded – its emission reduction target for 2021 (a reduction of at least 50% reduction from the 1990 level) ahead of schedule and also achieved the 2025 target on time (a reduction of at least 75% reduction from 1990 level). The reduction in 2021 was 57% and the reduction in 2025 was 76% in comparison to the 1990 level.

Monitoring of the targets was implemented in accordance with the Finnish Environment Institute's

ALAS calculation without F-gases, as they were not included in the set targets and are not a mandatory part of emission monitoring in the Covenant of Mayors. However, they will be included in the targets and monitoring in the future, as they are also part of the national climate targets and the compatibility of the municipal/regional and national emission calculations that provide the basis for ALAS calculation.

- The emission reduction calculated on the basis of the emission targets valid in 2025 is 76% compared to the 1990 level.
- Turku's total emissions according to the ALAS calculation (including F-gases) were 369 kt CO₂-eq in 2025 (preliminary data). Calculated in this way, emissions have decreased by 74% since 1990 (Diagram 1, all emissions according to the ALAS calculation).
- Emissions per capita in Turku decreased by 80% from the 1990 level (9.0 t CO₂-eq/resident) by 2025 and are now 1.8 t CO₂-eq/resident.
- The greatest reductions were in district heating emissions: 94% (315 kt CO₂-eq) in 1990–2025. Discontinuing the use of fossil fuels and switching to use of biofuels and waste heat have enabled rapid emission reductions, especially since 2014.
- The decrease in the use of heating oil has reduced emissions from individual heating of buildings by 88% (136 kt CO₂-eq) in 1990–2025.
- The shift of national and local electricity production from fossil fuels to renewable and car-

bon-free energy sources and improved energy efficiency have reduced emissions from electricity consumption by 77% (160 kt CO₂-eq) in 1990–2025.

- Emissions from road transport have decreased by 48% (158 kt CO₂-eq) as a result of improved energy efficiency and electrification of the vehicle fleet. The development and use of sustainable modes of transport and the blending obligation for biocomponents in fuel have also played a key role in reducing emissions.
- The share of road transport in the city's emissions has increased from 23% (1990) to 47% (2025), as emissions from energy production and consumption have decreased faster than emissions from road transport.
- Industrial emissions have decreased by 89% (77 kt CO₂-eq) since 1990. On the other hand, emissions from working machinery have increased since 1990, and the significance of machinery in total emissions is increasing.
- Emissions from waste management have decreased by 70% (62 kt CO₂-eq) in 1990–2025. The share of emissions from rail, water and agricultural transport in Turku is small. F-gas emissions are decreasing as a result of regulation concerning refrigerants.

The SECAP calculation performed in accordance with the common European Union model for climate work (Covenant of Mayors) differs from the ALAS calculation, especially with regard to electricity consumption, industry and waste management (see

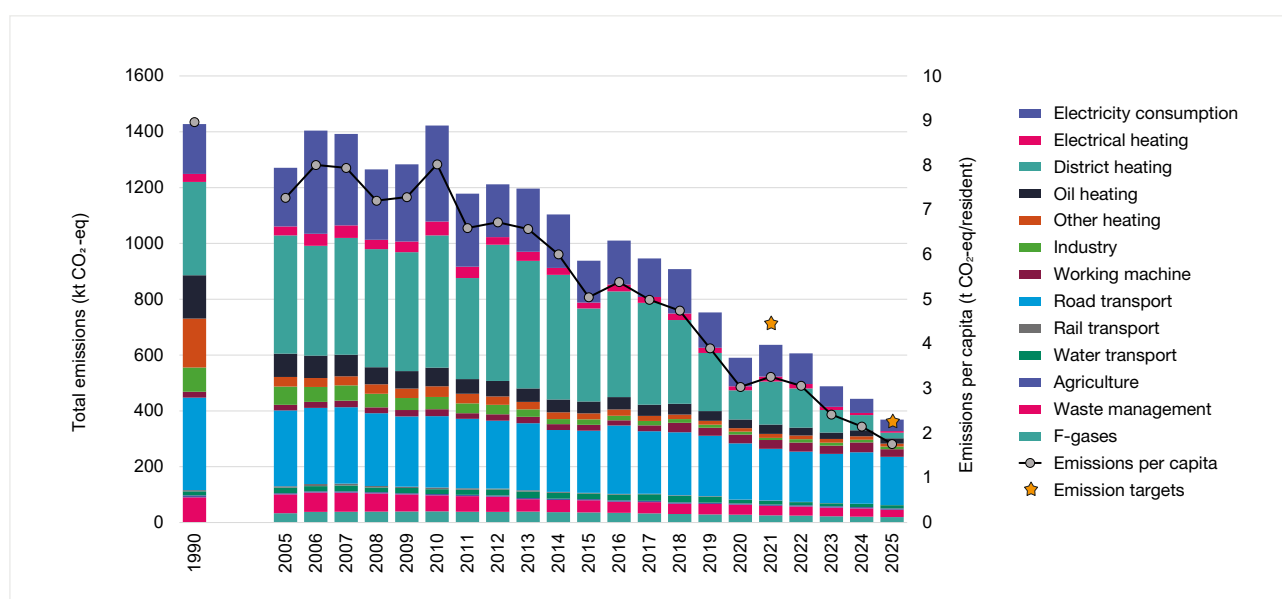


Diagram 1. Emissions development according to the ALAS model in Turku in 1990–2025 by sector (columns) and per capita (line). The data for 2025 is preliminary. The milestones set for 2021 and 2025 are indicated with stars.

Annex 8). When calculated using the SECAP method, emissions were 356 kt CO₂-eq in 2025 (Diagram 2) and they decreased by 76% from 1990 (Diagram 3).

- Using the sector breakdown of the SECAP method, the sectors that produced the most emissions in 2025 were private and commercial transport (51%), service buildings (12%) and waste management (9%).

- When energy-based emissions are examined by source of energy, the largest emissions in 2025 were caused by the use of diesel (33%) and petrol (27%) in transport and working machinery. The share of emissions from electricity is 10%.
- In monitoring according to the SECAP calculation, emissions per capital decreased by approximately 82% from the 1990 level (9.5 t CO₂-eq) by 2025 (1.7 t CO₂-eq).

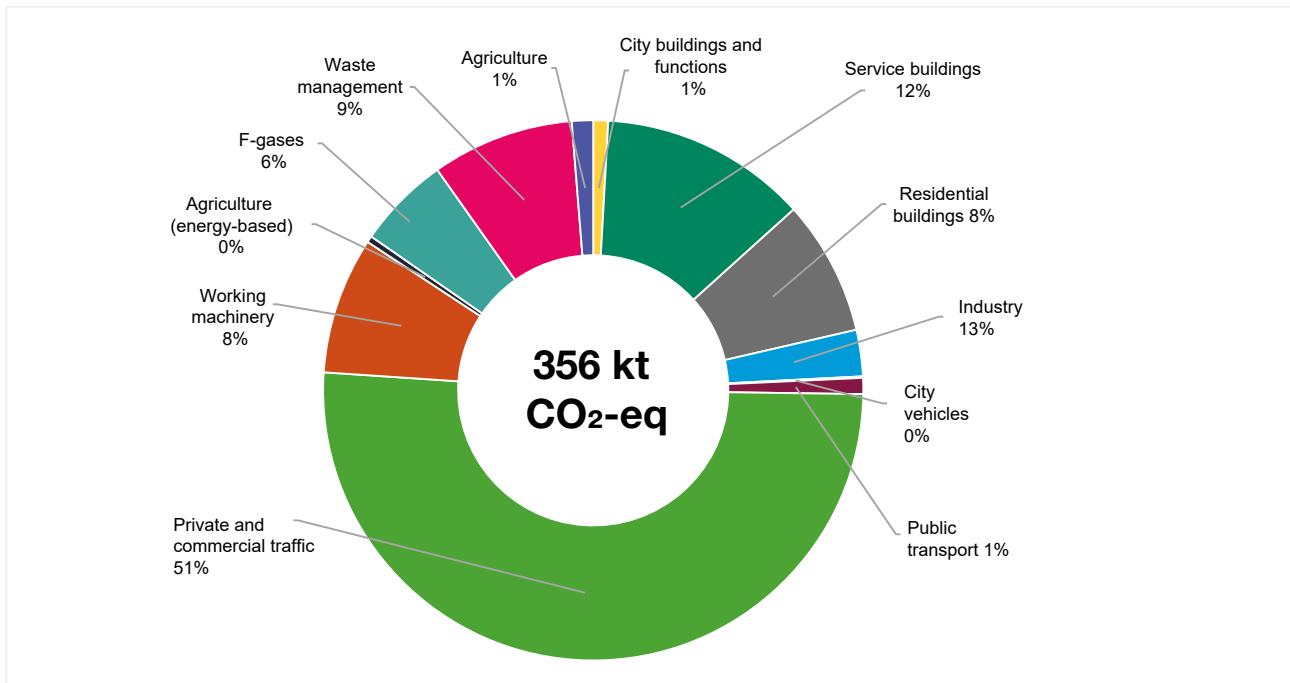


Diagram 2. Turku's emissions in 2025 calculated using the SECAP method and broken down into SECAP reporting sectors (preliminary data).

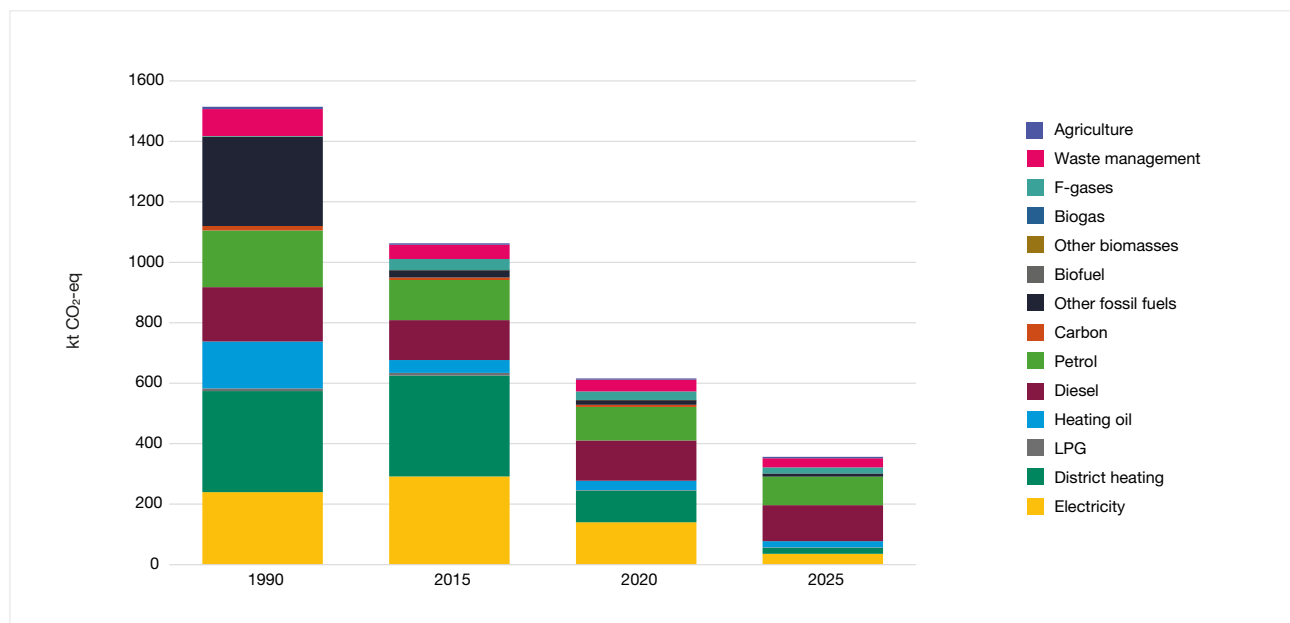


Diagram 3. Turku's emissions in 1990, 2015, 2020 and 2025 (preliminary data) using the SECAP method. Energy-based emissions are presented by source of energy.

Emissions and sinks in the land use sector

Turku aims to achieve carbon neutrality in 2029 and to increase climate positivity after that. These targets require that the remaining emissions are absorbed by carbon sinks within the City of Turku or offset by means of carbon removals and other compensation measures outside Turku.

The size of carbon sinks in the City of Turku's land use sector was estimated using the Finnish Environment Institute's calculation methods. The estimate includes changes in the carbon storages of forests and soils located in the Turku region as well as greenhouse gas emissions caused by cropland and grassland areas. The calculation is based on the land use distribution during the year under review, i.e. the results do not include changes in land use, such

as the transfer of a forest, field or other land area to another land use category.

In 2021–2024, the size of the sink in Turku's land use sector was 12–14 kt CO₂-eq. (Diagram 4). This covers approximately 10% of the total amount of carbon sinks and carbon offsets required for the 2029 carbon neutrality target once the 90% emission reduction has been achieved.

The maximum sink potential of the land use sector in Turku is approximately 37 kt CO₂-eq, which would cover just over one quarter of the sinks and carbon offsets required for the carbon neutrality target. In order to reach the maximum potential, it would be necessary to avoid felling and implement climate measures on cropland.

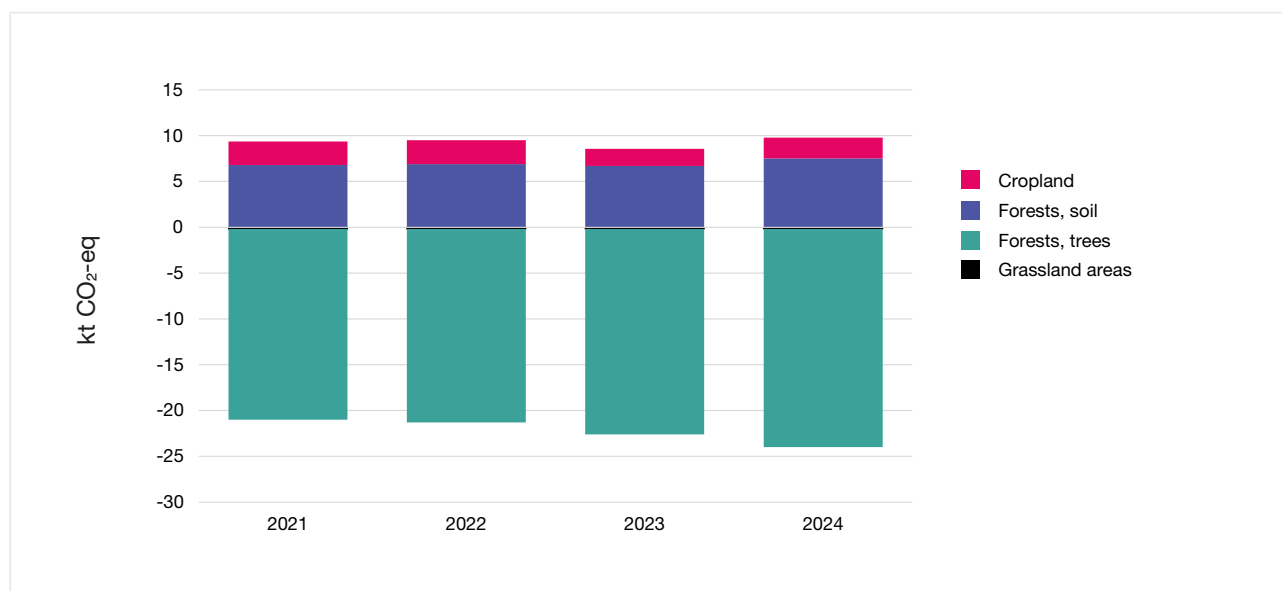


Diagram 4. Emissions and sinks in the land use sector in Turku 2021–2024.

Development paths to 2029, 2035 and 2040

The attainment of the set targets was examined by means of scenario analysis in accordance with the common EU model for climate work.

The baseline year for the scenario analysis is 2025. The evaluation of emissions development has taken into account the national climate policy guidelines and the impact assessments of the measures: the latest Medium-Term Climate Plan (KAISU 3) and the National Energy and Climate Strategy, and the results of the medium-term impact assessment report (KEITO report) assessing their impacts.

In addition to national policies, the scenarios include the emission impacts of measures decided in Turku

that are more ambitious than the national climate policy. The key assumptions for the scenarios are presented in Table 2.

Scenarios and attainability of the target

ALAS scenarios

Turku's emissions development until 2040 was examined using the ALAS method in two scenarios. In the reference scenario, continuation of national guidance and measures already implemented in Turku will provide an 80% emission reduction in 2029 compared to the level in 1990 (Diagram 5). In addition to the above, the climate plan scenario that takes into account the additional measures outlined in the Climate Plan states that a reduction of 85% in emissions will

be achieved in 2029 compared to 1990. Unless other additional emission reduction measures are implemented, the scenario will fall short of the 90% emission reduction target set for 2029 by 76 kt CO₂-eq. Any new emission reduction measures should specifically target emissions from road transport. However, carbon neutrality can also be achieved without new emission reduction measures by compensating for all remaining emissions by strengthening carbon sinks and through offsetting measures.

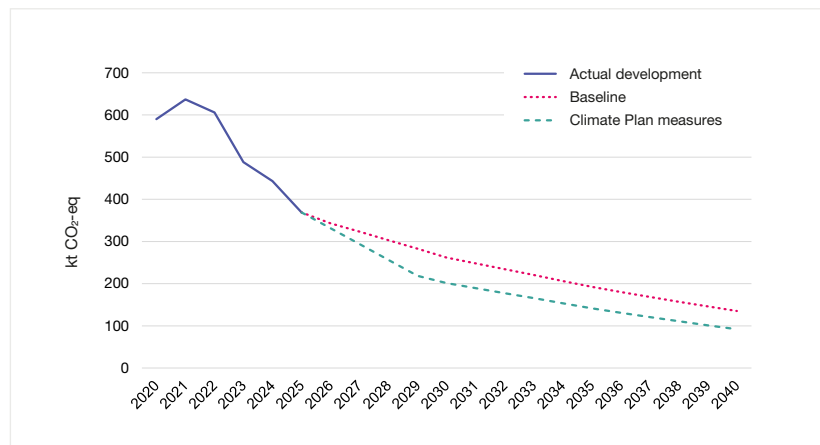


Diagram 5. Actual development of Turku's greenhouse gas emissions in 2020–2025 and the Reference and Climate Plan measures scenarios for 2026–2040. The data for 2025 is preliminary.

Table 2. Key scenario assumptions for 2029 in the Climate plan measures scenario. The assumptions are the same for the ALAS calculation system and SECAP scenarios.

	National climate policy steering	Measures of the City of Turku and stakeholders
Electricity consumption	Electricity consumption will remain at 2025 levels. An improvement in the energy efficiency of buildings will compensate for increased electricity consumption in road transport, industry and working machinery.	
Emission factor of electricity	The production of electricity in Finland will be nearly emission-free by 2029.	The energy production of Turku Energia will be nearly carbon neutral by 2029 (apart from exceptional situations and consumption peaks).
District heating consumption	National climate policy will support the improvement of energy efficiency in the building stock.	District heating consumption is expected to remain at the 2025 level, even though the district heating network is likely to expand somewhat. The implementation of energy efficiency measures in buildings will contain the increase in overall consumption level.
Emission factor of district heating	Emissions trading at the EU level and national steering of fuel prices as well as statutory regulation will guide people towards low-emission solutions.	District heating production will be nearly carbon neutral in 2029. Some oil will be used for peak power production, but otherwise the production is based on biomasses, waste heat and electricity.
Individual heating of buildings	Emissions from oil heating and other individual heating will decrease by 90% from the level in 2025. The transition will be guided by the expansion of emissions trading at the EU level (ETS2) and the biofuel oil distribution obligation at the national level as well as subsidies granted for replacement of oil heating. Heating method renovations made possible by national guidance will be carried out in Turku. The transition will be supported by providing information on how to implement renovations.	

	National climate policy steering	Measures of the City of Turku and stakeholders
Industry	Emissions from industrial fuel use will decrease by 20% from the level in 2025 by means of a reduction in the use of fossil fuels, increased use of biomasses and electrification of processes. The transition will be guided by energy taxation at the national level, but the measures will require active implementation by regional actors.	
Working machinery	Emissions from working machinery will decrease by 60% from the 2025 level through the obligation to distribute fuel biocomponents, the expansion of emissions trading (ETS2) and the electrification of machinery. The Green Deal for working machinery will support the transition in Turku.	
Road transport	An increase in the distribution obligation for fuel biocomponents, expanded emissions trading (ETS2) and electrification of the vehicle fleet will reduce road transport emissions by 24% from the 2025 level by 2029.	Sustainable and low-carbon mobility measures will reduce emissions by 9% from the 2025 level by 2029.
Other modes of transport	According to national scenarios, emissions from waterborne transport and rail traffic will decrease by 5% and 38% from the 2025 level. Emissions from rail traffic will be reduced by a decrease in the emission factor of electricity and the distribution obligation for fuel biocomponents.	
Agriculture	Emissions from agriculture will decrease by approximately 4% from the 2025 level by 2029. This development is the result of, for example, a reduction in the number of animals, an increase in precision farming and greater use of recycled fertilisers.	
Waste management	Emissions from waste management will decrease by 26% from the 2025 level by 2029. Emission development will be particularly affected by a decrease in the amount of biodegradable material in landfills.	
F-gases	Due to international regulation on refrigerants, F-gas emissions will decrease by 34% from the 2025 level.	
Land use sector	At the national level, steering will take place via implementation of the Climate Plan for the Land Use Sector.	The carbon sinks of forests will be maintained and efforts made to strengthen them, especially by limiting felling in city-owned forests and by creating incentives for private forest owners to extend forest cycles. The net balance will remain at the 2024 level.
Offsetting measures	The use of carbon offsetting will allow Turku to achieve carbon neutrality in 2029. Even after this, offsets will be purchased in a way that makes it possible to strengthen climate positivity.	

The measures outlined in the Climate Plan will provide the largest emission reductions in road transport, district heating, oil and other types of heating, and working machinery in 2025–2029 (Diagram 6).

In the scenario containing climate plan measures, emissions per capita will decrease from the 2025 level (1.8 t CO₂-eq) by approximately 44% by 2029 (1.0 t CO₂-eq).

The biggest sources of emissions in 2029 will be road transport (53%), electricity consumption (13%), and waste management (9%) (Diagram 7).

In order to achieve the carbon neutrality target, efforts should focus on reducing emissions from road transport more rapidly. In addition, the remaining amount of emissions must be compensated by carbon sinks and offsetting measures.

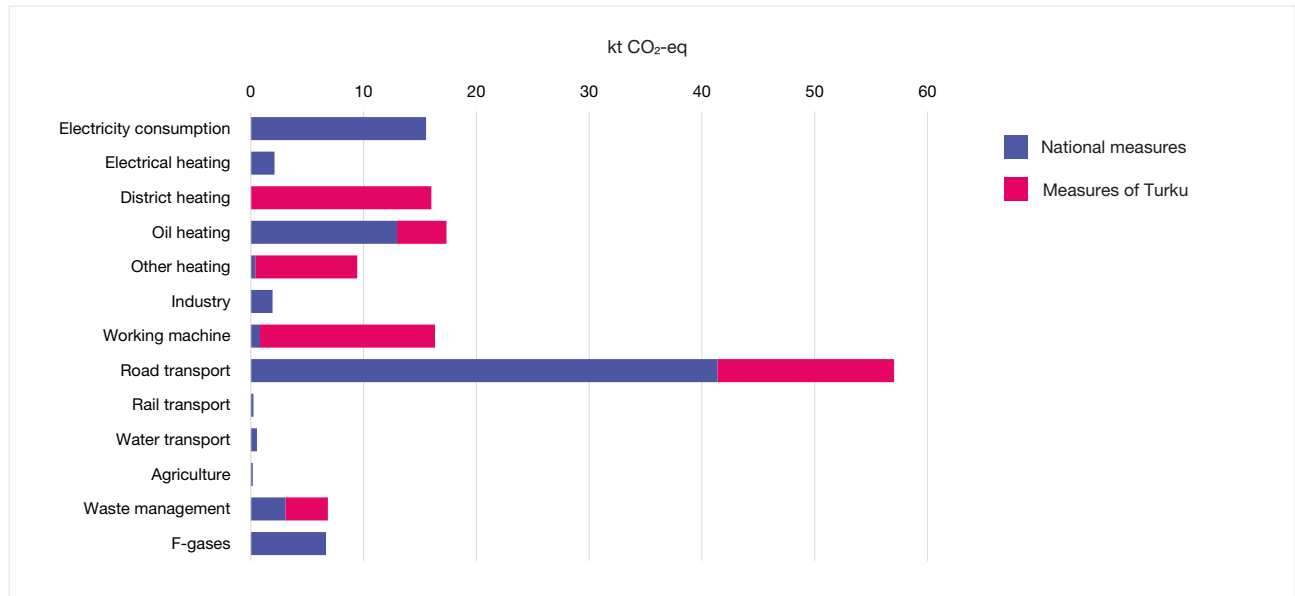


Diagram 6. Effects of national and Turku climate plan measures on emissions in 2029 compared to the 2025 level using the ALAS method. National guidance particularly applies to emissions from electricity use, oil heating, road transport and F-gases.

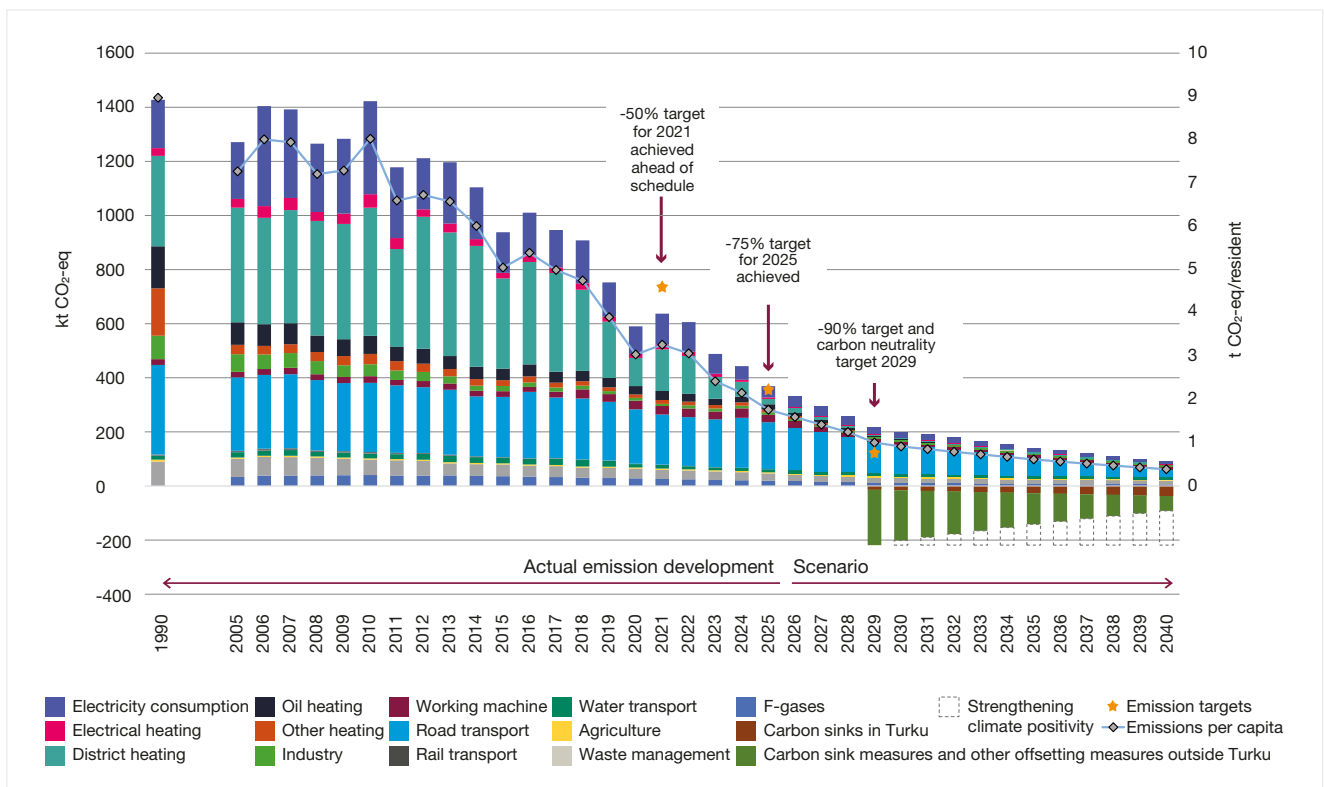


Diagram 7. Turku's actual emissions in accordance with the ALAS model in 1990–2025 and in the Climate Plan Measures scenario 2026–2040. The data for 2025 is preliminary. Sinks in the land use sector will be at the 2024 level in 2029 and then grow towards the maximum potential.

By 2040, emissions in the reference scenario will decrease to 135 kt CO₂-eq while emissions in the scenario that takes existing climate plan measures into account will decrease to 92 kt CO₂-eq, which means they will be 94% below 1990 levels. The cli-

mate plan policies will lead to more reductions than the national measures, especially in emissions from district heating consumption, working machinery and road transport.

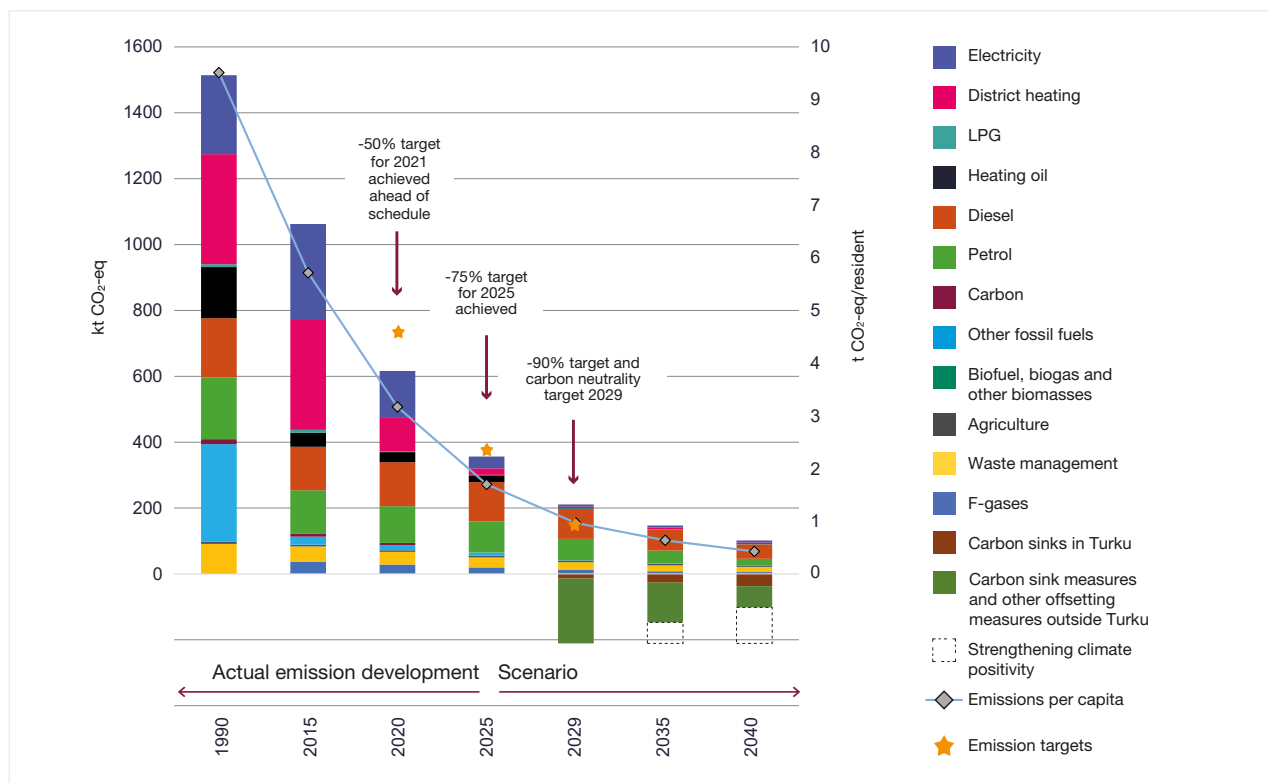


Diagram 8. Turku's actual emissions in accordance with the SECAP method in 1990, 2015, 2020 and 2025 (preliminary data) and scenarios for 2029, 2035 and 2040. Sinks in the land use sector will be at the 2024 level in 2029 and then grow towards the maximum potential.

SECAP scenarios

In the SECAP scenario (Diagram 8), emissions will be reduced by 86% in 1990–2029, which means the measures outlined in the Climate Plan will produce a result that is approximately 60 kt CO₂-eq short of the 90% target level. However, the carbon neutrality target will be achieved with the expected development in the land use sector and the implementation of offsetting measures. Emissions per capita will be 1.0 t CO₂-eq in 2029, which will be 90% lower than in 1990 (9.5 t CO₂-eq).

Emissions will decrease by 2029 – especially as emissions from electricity and district heating fall to a low level, the use of heating oil decreases, and the use of fossil fuels in road transport and working machinery decreases.

The emission level will be 147 kt CO₂-eq. In 2035 and approximately 102 kt CO₂-eq in 2040. Emissions per capita in 2035 will be approximately 0.6 t CO₂-eq and 0.4 t CO₂-eq in 2040.

The reduction in emissions in 2025–2029 will be approximately 145 kt CO₂-eq, most of which is

associated with a reduction in the use of fossil fuels in transport and working machinery (Diagram 9). Emissions from electricity and district heating production will also decrease as the distribution of energy sources becomes more low-carbon. The use of heating oil in individual heating of buildings will also decrease very close to zero by 2029. National guidance particularly applies to emissions from oil heating, road transport and F-gases.

Emissions from consumption

There is no established calculation model for calculating emissions from consumption, which means the carbon footprint of the city or city residents. Turku monitors emissions from consumption with the two most commonly used calculation models in Finland: ALasKulutus and Kulma. Turku also actively participates in the development of calculation. The calculation models for emissions from consumption differ in terms of methods and definitions, but they still describe the same thing: emissions caused by activities in the city, both within and outside the city – in Finland and abroad.

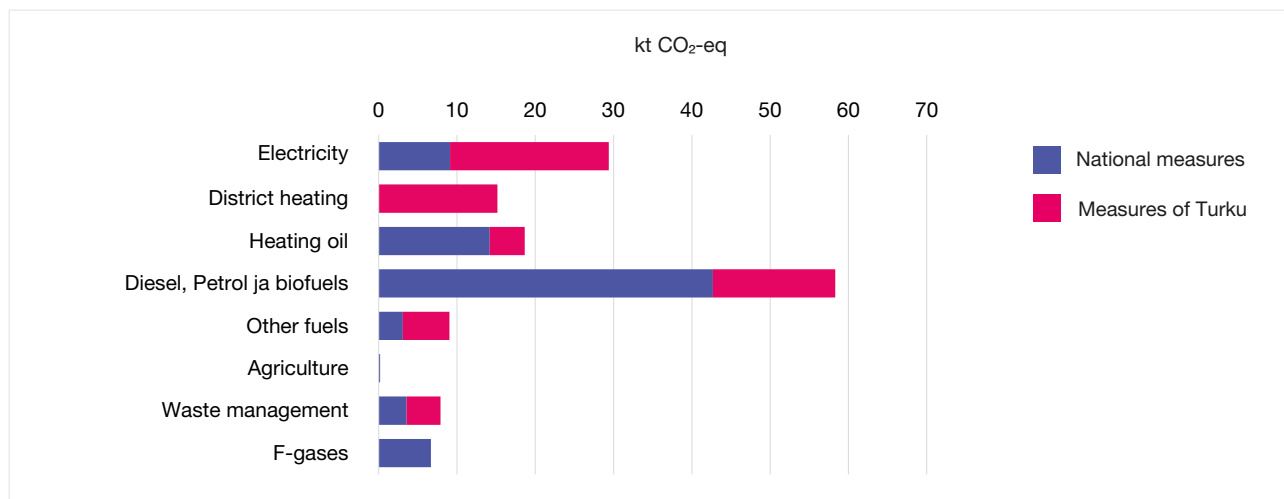


Diagram 9. Impacts of national and Turku climate plan measures on emissions in 2029 in comparison to the 2025 level using the SECAP method.

According to the ALasKulutut model, emissions from Turku's consumption have decreased by 22% between 2005 and 2019 (Diagram 10). If the magnitude of the annual change remained at the same level between 2020 and 2035, Turku would be close to achieving its goal of cutting emissions from consumption in half. Emissions per capita have decreased by almost 30% (2005–2019).

According to the Kulma model, emissions from consumption in Turku in 2024 were slightly less than 1,600 kt CO₂-eq, or nearly 8 t CO₂-eq/resident. The amount of emissions is approximately 3.5 times higher than Turku's territorial emissions in the same year. In other words, the majority of emissions caused by activities in the City of Turku area are realised outside the region, which is why reducing emissions from consumption is also a key element in climate change mitigation. However, it should be noted that emissions from consumption in Turku are also included in the emissions of areas that produce commodities.

From a territorial perspective, this means that Turku can achieve carbon neutrality and climate-positivity despite the emissions from consumption. However, achieving the targets for resource wisdom in accordance with the City Strategy and enabling a sustainable city and lifestyle will also require a stronger focus on emissions from consumption.

Emissions calculated according to the Kulma model emphasis emissions from the procurement of food, goods and services. As a result, reducing these will play a key role in reducing emissions from consumption. Emissions from construction are also significant.

Adaptation status review

The responsibilities for climate change adaptation are divided among several levels in Finland. The Ministry of Agriculture and Forestry has the main responsibility for the National Climate Change Adaptation Plan, and other ministries are responsible for adaptation in their own sectors. The Economic Development Centres and the Regional Council of Southwest

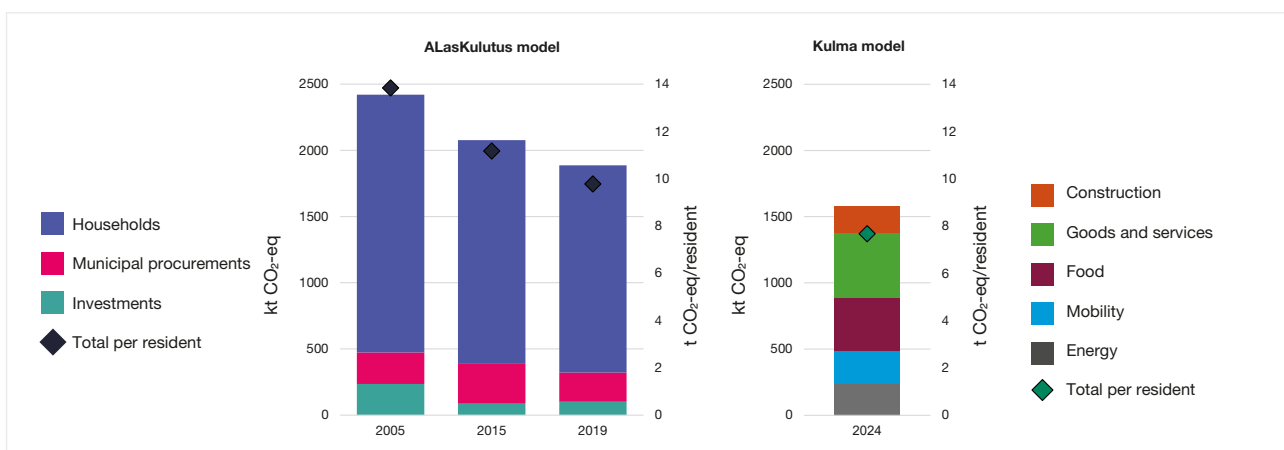


Diagram 10. Total emissions from consumption in Turku (columns) and emissions per capita (diamonds) using the ALasKulutut model in 2005, 2015 and 2019 and the Kulma model in 2024.

Finland support regional adaptation work. The well-being services county is responsible for ensuring the functioning of social welfare and health care services and the well-being of the population in changing weather conditions, while the role of rescue services is emphasised in emergencies caused by extreme weather events. Turku City Group plays a key role in practical adaptation and has responsibility for areas such as city planning, stormwater management and local infrastructure.

Adaptation is still fragmented across different sectors.* Turku is an active participant in the EU Mission on Adaptation, implementation of the National Climate Change Adaptation Plan and many development projects, but the fact that the work is still in progress affects the situational picture. For example, well-established models for monitoring adaptation work in cities do not really exist at this time.

**For example, see Pietola L., Torniainen T. and Turkki V. 2026. Climate change adaptation in Finland. (Summary in English) Sitra Memorandum 29.1.2026.*

The situational picture regarding climate change adaptation in Turku is based on self-assessment in line with the SECAP report model. The adaptation scoreboard in the model was used to assess the status of adaptation work on a scale of A-D, where:

- A = Taking the lead (over 75% completed)
- B = Forging ahead (50-75% completed)
- C = Moving forward (25-50% completed)
- D = Not started or getting started (less than 25% completed).

The review was performed by a cross-administrative group consisting of experts who participated in the City of Turku's adaptation work, and it was used to

create a picture of the current status of the adaptation process in the City of Turku. The assessment was carried out with the same model in 2018 and 2022, which makes it possible to monitor development.

The current status of the adaptation process was illustrated with the spider graph used in the SECAP report model (Diagram 10). The City of Turku's areas of adaptation that have already been developed and processed in more depth are shown in green. The areas that still require work are outside the green area. The assessed stages are presented in more detail in the annex.

Based on a review of the current situation, it can be concluded that work has already progressed well in many areas, but no area was ranked in the best category. The risks of climate change in Turku have been assessed reasonably well and measures identified, the increase in information has revealed new needs, for example, regarding a more detailed analysis of vulnerable groups of people.

In comparison to the previous assessment, progress has been made in terms of systematically implementing measures, such as green efficiency obligations and including adaptation perspectives in the steering of investments. Significant adaptation measures have already been planned and implemented, for example, to improve the service reliability of critical infrastructure. However, improving the overall situation and coordination of adaptation measures as well as the adequacy of competence and resources in the city's services continues to be a challenge. For example, key adaptation measures related to water management, ecological risks and heat risks should be further strengthened. Turku's climate change adaptation and climate risk management are described in more detail in Chapter 9.

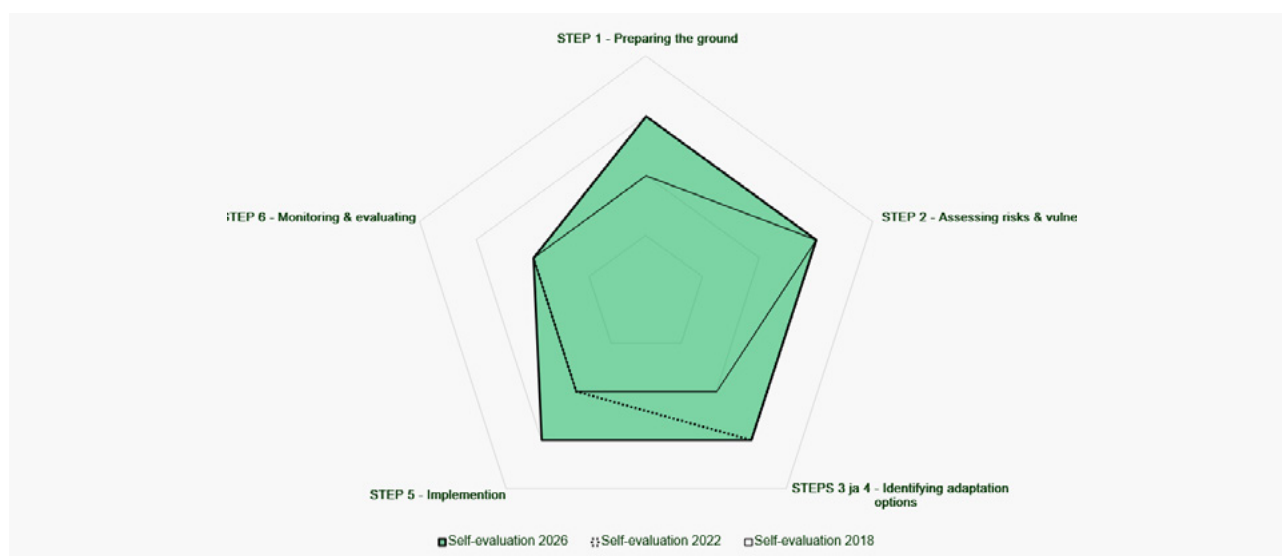


Diagram 11. Situational review of Turku's climate change adaptation.

5. Carbon neutral and climate resilient energy

Overview of energy

Significant investments in energy reform have been made in the Turku region since 2009. The development projects have progressed as planned, and the investments have brought work and revenue to the Turku city region. Emissions from electricity consumption, district heating and individual heating have decreased to very low levels. Energy efficiency measures and development projects have progressed as planned. As a whole, our energy transition has been the fastest of Finland's large cities and it has progressed strongly in all areas. District heating has shifted almost entirely to carbon-neutral production and production has simultaneously diversified: in 2026, about half of the heat will be produced using technology that does not involve combustion (Image 10). The profitability of Turku Energy has increased, and energy has been affordable and reliable for customers.

In its own property portfolio, the City of Turku has achieved the targets of the Energy Efficiency Agreements 2008–2016 and 2017–2025 and will continue its effective energy efficiency work, thus saving energy and reducing costs.

The transition to carbon-neutral energy production that is not based on combustion and curbing growth in energy consumption will continue to require stakeholder participation and active measures, innovations and investments. The energy transition must continue, strengthening biodiversity and carbon sinks. At the same time, the realisation of social equity must be ensured.

In order to continue, the transition will also require stronger national preconditions, such as sufficient availability of electricity, increased transmission network capacity and viable solutions for technologies such as carbon capture. These factors will affect the schedule for fully utilising the carbon sequestration potential of the hydrogen economy and bioenergy.

The challenge of energy poverty

Energy poverty refers to a situation where a household's energy costs are high in relation to their disposable income or where housing cannot be maintained at a level that is adequate for health and well-being. Underlying factors in energy poverty include low income, poor energy efficiency of the building and high energy prices. Energy poverty may be manifest, for example, in the inability to sufficiently heat a home in the winter or cool it during hot periods. The impacts are particularly severe for older people, families with children, people with long-term illnesses and other vulnerable groups.

In Turku, the prevalence of energy poverty has been examined through an analysis performed in accordance with the Covenant of Mayors. The analysis produces information on the extent of energy poverty, the risk factors associated with it and the population groups that are particularly susceptible to this challenge. This information is utilised when planning and targeting climate measures to ensure that emis-

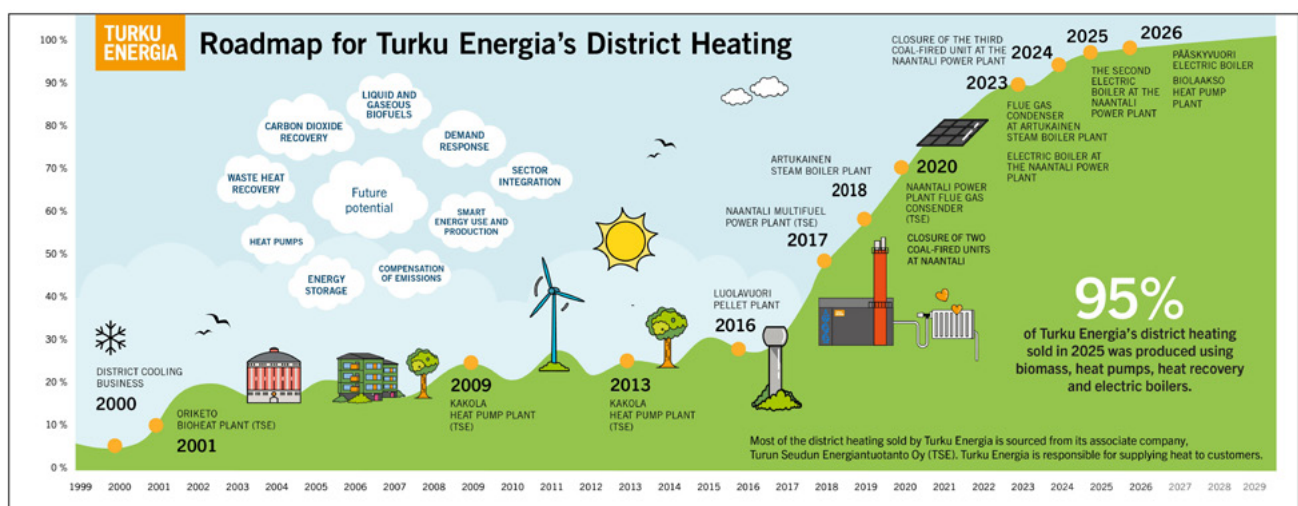


Image 10. Turku Energia's district heating roadmap.

sion reduction measures also support the well-being of residents and affordability of housing.

In this climate plan, Turku sets its first energy poverty target under the EU Covenant of Mayors. Achieving this target will require the ability to better identify the factors that increase energy poverty, target support measures and advice, and promote the energy efficiency of buildings and affordable, low-emission housing in a fair manner.

Guiding principles for energy development

The development of a carbon-neutral, climate resilient and equitable energy system in Turku is guided by the following principles, which were prepared in broad cooperation and have, for the most part, already been successfully implemented over a long period:

1. Turku implements a climate-positive energy system in cooperation, strengthening the role of companies, communities and residents in the energy transition.
2. The energy system is developed using the best possible knowledge base, local research and in a way that strengthens Turku's energy expertise.
3. Energy solutions and energy procurement emphasise the impacts on sustainability, regional economy and profitability.
4. New energy production investments are implemented in a way that strengthens biodiversity and carbon sinks.
5. Development of the energy system in the Turku region utilises smart solutions, a multi-directional approach, storage and the full potential of energy sources and production opportunities in the region, and improves energy efficiency.
6. Development of energy steering and energy efficiency in the city's own building stock is guided by knowledge-based management and adoption of the best solutions.
7. Work to develop and maintain Turku's energy system ensures that reliable and sufficient energy is available and accessible to everyone in Turku regardless of their income level.
8. Turku's energy system is developed in a way that reduces its vulnerability to extreme weather events and the impacts of climate change.

Development targets

The energy-related development targets prepared in broad and long-term cooperation are:

Energy production

- The heat, cooling, steam and electricity used in the Turku region will be produced in a carbon neutral manner starting in 2029 at the latest, with consideration to security of supply and the availability of affordable energy.
- By 2035, at least 70% of the energy production in the Turku region will be non-combustion-based and/or equipped with carbon capture technology.
- Turku City Group will develop its energy production, ownership and procurement to support climate-positivity so that the amount of renewable and carbon-neutral energy exceeds the region's own consumption from 2029 onwards, thus serving a larger area than Turku.
- Strong investments will be made in security of supply and delivery reliability in energy production, and the related exceptional situations may also affect the achievement of other targets.

Energy consumption

- By 2035, the energy consumption of the Turku building stock will be significantly reduced by improving energy efficiency and property energy management, both in the city's own buildings and in the private sector where appropriate.
- The City of Turku will join the Energy Efficiency Agreement for Public Sector for the 2026–2035 period and undertake to implement its overall and intermediate targets (saving at least 10% over the entire period and intermediate target 6).
- Efforts will be made to accelerate the process of phasing out oil heating in public properties and those owned by private individuals, companies and organisations so that emissions from oil heating decrease by 90% from 2024 levels by 2029.

Energy poverty

- Turku will strive to reduce the share of energy-poor households from the current 5.5% to 4.0% by 2029, to less than 2% by 2035 and to nearly zero by 2040.
- The city will implement targeted measures to reduce energy poverty on the basis of just transition principles.

Energy measures

The measures targeting energy were compiled through collaboration involving a large expert group consisting of key persons from the city, Turku City Group and partners. Some of the measures are in progress and some are continuous by nature. There are also new measures and ongoing measures that have undergone further development or still require development. In accordance with the model for continuous development of climate action developed and applied by the City of Turku to implement its

climate work, measures are continuously being examined, prepared, introduced, evaluated and further developed.

The measures presented in the table have a significant impact on energy targets, but the list is subject to continuous updating and steering. The measures as a whole are not approved by a single decision but are managed through annual steering, investment plans, Group steering, development projects and cooperation.



Image 11. An example of successful energy reform work is Turku Student Village, which produces a significant share of the energy it consumes. Image: Anders Portman, Martin Sommerschild, Kuvatoimisto Kuvio Oy

Measures: Carbon neutral and climate resilient energy	Responsible parties City of Turku and other actors
ENERGY PRODUCTION AND PROCUREMENT	
The measures (including investments) required to increase the share of carbon-neutral energy will be ensured and implemented so that it exceeds 95% of the heat and electricity sold by Turku Energia on a permanent basis and reaches the level required by the carbon neutrality entity by 2029.	Turku Energia City of Turku/Financial Services, Corporate governance, Climate, nature, and circular economy
The measures (including investments) required to produce district cooling and steam on a fully renewable basis will be ensured and implemented (realised since 2025).	Turku Energia City of Turku/Financial Services, Corporate governance, Climate, nature, and circular economy
A plan/roadmap will be prepared to increase non-combustion-based production towards 2029, 2035 and 2040 (e.g. increasing utilisation of heat pumps and waste heat, storage solutions (water/heat/batteries, etc.), piloting of different technologies).	Turku Energia, Turun Seudun Energiantuotanto Oy, City of Turku, Turku University of Applied Sciences, other partners
The possibilities, measures and investments for introducing carbon capture in cooperation with industry and the Government will be assessed, the assessments will be updated and measures prepared where necessary and as permitted by circumstances towards 2029, 2035 and 2040.	Turku Energia, Turun Seudun Energiantuotanto Oy, City of Turku/Climate, Nature, and Circular Economy other partners
The development of energy positive neighbourhoods will be continued and this work expanded to new areas – entire neighbourhoods, blocks, sports centres and other clusters and combinations of suitable functions – based on the experiences gained in the RESPONSE project in the Turku Student Village.	City of Turku / Climate, Nature, and Circular Economy, Urban Construction and Facilities, Urban Environment / Strategic steering and the relevant service areas
The energy system will be developed as a whole, avoiding partial optimisation in an individual building or district.	Turku University of Applied Sciences, Turku Energia, Monitoimitilat, partners
Investments aimed at utilising regional waste heat and improving energy system efficiency will be made as part of developing a carbon-neutral energy system that supports the circular economy.	Turku Energia, City of Turku / Urban environment
Turku Energia will help/serve its customers to strengthen energy efficiency and reduce their emissions. The company's carbon handprint will also be realised through service products and energy partnerships – as a reduction in emissions from customers and partners.	Turku Energia, customers and partners
Active measures will be taken to accelerate the process of phasing out oil heating. Residents and businesses will be encouraged to implement renovations and to improve energy efficiency.	City of Turku / City planning, Building control, Urban Construction and Facilities Other actors / Turku City Group subsidiaries

ENERGY MEASURES TO SAFEGUARD NATURE

Wind and solar power investments and the existing domestic production will be implemented in a way that also strengthens biodiversity (taking compensation into account if necessary). Possible methods include creating new habitats in production areas, utilisation of grazing and restoration.	Turku Energia City of Turku/ Urban planning and land property
New solar energy investments will primarily be implemented in the built environment and in a way that does not decrease carbon sinks in forests.	Turku Energia City of Turku/ Urban planning and land property
Biodiversity and carbon sink impacts will be taken into account when procuring bioenergy, which means ensuring that the supply chain is sustainable.	Turku Energy, Turun Seudun Energiantuotanto Oy, City of Turku/Urban planning and land property, Climate, nature, and circular economy

ENERGY EFFICIENCY IN TURKU CITY GROUP

The Energy Efficiency Agreement will be used to prepare and steer targets for promoting energy efficiency in the city's own property portfolio and infrastructure. The City of Turku will join the Energy Efficiency Agreement for 2026–2035, commit to its targets, and plan and implement the measures needed to achieve the target	City of Turku/Urban construction and facilities, Climate, nature, and circular economy
Implementation of the agreement at the target level will be monitored in the Climate Plan (energy consumption and development of emissions) and in more detail through the responsible parties. Smart buildings and real-time data will be utilised to optimising energy consumption and knowledge-based management of properties.	City of Turku/Climate, nature, and circular economy, Urban construction and facilities, Information Management, Kiinteistö Oy Turun monitoimitilat
Demand-side flexibility that optimises overall energy consumption in the property portfolio will be examined and implemented.	City of Turku/Urban construction and facilities, Information Management, Kiinteistö Oy Turun monitoimitilat
The possibilities for improving energy efficiency, demand-side flexibility and building-specific energy production will be anticipated and taken into account when planning and implementing renovation solutions for new properties and the existing building stock.	City of Turku/Urban construction and facilities, Information Management, Financial services, Kiinteistö Oy Turun monitoimitilat
Development of energy efficiency will focus on implementing the best solutions and on development work that is not dependent on technologies.	City of Turku/Urban construction and facilities, Information Management, Kiinteistö Oy Turun monitoimitilat

ENERGY EFFICIENCY IN PRIVATELY OWNED BUILDINGS

Energy efficiency will be actively strengthened and encouraged through the means available to the city as part of planning regulations, the building permit process and advice as well as other forms of regulation, steering and cooperation.

Possible means include guidance and advice, promoting flexibility in energy use also in private buildings, steering the energy efficiency of the private building stock and enabling regulation (such as planning regulations that support energy efficiency), energy renovation guidance for housing companies, and technical advice.

City of Turku / City planning, Building control, Climate, nature, and circular economy, Urban construction and facilities, Information management, Kiinteistö Oy Turun monitoimitilat, Partners

COOPERATION

RDI projects and partnerships will be utilised to accelerate the energy transition and strengthen competence and vitality in the Turku region.

City of Turku / Climate, nature, and circular economy, project development, Urban environment, Urban construction and facilities
Turku Energia, Turku University of Applied Sciences and partners

The energy transition will be implemented and new sustainable solutions (energy production, energy saving and energy efficiency, energy storage, demand response) developed in cooperation in a way that strengthens the role of local residents, higher education institutions, businesses and communities in the energy transition.

City of Turku / Climate, nature, and circular economy, project development, Urban environment, Urban construction and facilities
Turku Energia, Turku University of Applied Sciences and partners

ENERGY POVERTY

Turku will primarily reduce energy poverty by targeting energy renovations at its own rental housing stock, especially those locations where energy consumption intensity is high and residents have poor ability to pay.

City of Turku / Corporate governance, segregation, Promotion of well-being and health
TVT asunnot and VASO

The city will strengthen targeted energy advice for privately owned buildings to complement national advisory services.

HEAT AND DROUGHT RISK MANAGEMENT

Turku and its partners will develop climate resilient and energy-efficient solutions to meet the growing need for cooling and air conditioning in properties. In particular, the city will promote the introduction of passive cooling methods along with active cooling.

The objective of the measure is to reduce the impacts of heat and drought risks on residents' health, built environment and urban nature.

City of Turku/Urban construction and facilities, city planning, Building control, Kiinteistö Oy Turun monitoimitilat, TVT Asunnot, VASO, Turku Energia, Turku University of Applied Sciences and partners

DEVELOPING DISASTER PREPAREDNESS

Businesses and communities operating in the city will be encouraged and supported in recognising the role they play in preparing for climate risks and exceptional situations throughout the city. Examples of these situations include an prolonged period of heat or disruptions in water and energy supply, which overload the capacity of authorities.

City of Turku / Climate, nature, and circular economy

Turku Energia, Turun Vesihuolto, Turun Seudun Vesi, Turku Energia, Lounais-Suomen Jätehuolto Oy, Wellbeing Services County of Southwest Finland

The vulnerability of the energy system to the impacts of climate change will be assessed and strengthening measures implemented, such as improving automation and protection. Decentralised and local energy production models will be developed for critical use, such as piloting micronets and support for property-specific reserve power solutions.

City of Turku / Climate, nature, and circular economy, project development, Urban environment, Urban construction and facilities

Turku Energia, Turku University of Applied Sciences and partners

INVESTMENTS TO INCREASE RESILIENCE

The reliability and climate resilience of critical infrastructure will be strengthened in advance by implementing proactive and cost-effective measures in cooperation with other actors in the region. Investment-related synergies will be utilised in innovative ways (e.g. the shore power project at the port).

Methods of ensuring that energy production is prepared for disruptions will be planned and implemented, e.g. ensuring reserve power for critical services, battery solutions and placement of reserve power.

Legislative barriers to the energy transition and preparedness will be removed. The city will actively influence the development of legislation and guidance in order to maintain the service reliability of critical infrastructure in changing climate conditions and extreme weather events.

(see also measures for climate risk management and adaptation)

City of Turku / Climate, nature, and circular economy, Corporate governance, Urban planning and land property, Regional public transport, Facility services and Infrastructure services

Others: Turku Energia, Turun Vesihuolto, Turun Seudun Vesi, Port of Turku, Lounais-Suomen Jätehuolto Oy, Turku University of Applied Sciences

6. Sustainable low-carbon mobility

Overview of sustainable mobility

The development of a sustainable and efficient/well-functioning transport system is critical for achieving a carbon-neutral Turku, for the vitality of the city and the well-being of its residents as well as for the development of the entire functional urban region. Turku has implemented effective climate measures for transport, especially by improving conditions for walking and cycling as well as public transport, carrying out comprehensive sustainable mobility projects and creating a Sustainable Urban Mobility Programme to guide the development of mobility in a more coordinated manner.

The city has also been active in regional cooperation on land use, housing and transport and serves as the responsible municipality and key developer of Föli regional public transport. At the same time, Turku has been preparing over the years for a high-capacity public transport system, which could be used to increase the share of sustainable mobility while supporting sustainable development of the urban structure as the city grows. On 18 May 2026, the City Council decided on the implementation of a tramway on the Varissuo-Kupittaa-City Centre-Portroute.

Turku has already successfully reduced greenhouse gas emissions from road and street traffic by almost 50% from 1990 levels and by more than 20% from 2015 levels. In order to achieve the carbon neutrality target, greenhouse gas emissions from road and street traffic in Turku must decrease by 50–80% from the 2015 level. The city will strive for fully carbon-neutral mobility in the 2030s.

Strengthening active forms of mobility and public transport and revitalising the urban environment support the city's sustainable growth and appeal, thus enabling a healthy, safe and pleasant living environment for all forms of life in the city.

A mobility system based on sustainable transport modes brings clear health benefits for Turku residents, as the noise, vibration and air pollution caused by traffic decreases. It simultaneously helps maintain and improve health, physical functioning and fitness as part of everyday routines. Smooth and sustainable mobility must be possible for everyone in Turku regardless of their income level and demographic group.

Turku actively builds a culture of sustainable mobility, which includes both established and new modes of sustainable mobility as well as solutions that make getting around easier. New mobility solutions can also generate innovations and create new business opportunities.



Image 12. An illustration of the tramway route on Hämeenkatu. Image: Turku Tramway Alliance

Sustainable mobility measures reduce emissions at different rates: some produce results in the short term, while the impacts of others are only visible decades later. This is why a sustainable transport system must be developed continuously, in a goal-oriented and consistent manner. Achieving carbon neutrality will require significant development breakthroughs in mobility.

The challenge of transport poverty

Transport poverty refers to situations where the costs of mobility necessary for everyday life, work and earning livelihood, education, social connections, health care and/or other essential services are high relative to available income. Transport poverty often affects vulnerable groups of people, such as older people, families with children, people with chronic illnesses, people living in remote areas and low-income households.

Reducing transport poverty is an important part of the acceptability of climate measures and a just transition to a low-carbon economy and a carbon-neutral society. The aim is to implement climate measures in

a way that improves the opportunities for essential mobility and well-being of residents in a sustainable manner.

In this Climate Plan, Turku is setting its first transport poverty target based on the definitions, research and common policy framework of the European Union. Achieving this target will require better identification of the factors that increase transport poverty, targeted support measures and advice and – above all – promotion of a sustainable urban structure that provides the foundation for affordable public transport, walking and cycling as well as statutory mobility services for special groups that are sustainably implemented.

Guiding principles for mobility-related climate measures

The development of a carbon-neutral, climate resilient and equitable mobility system in Turku is guided by the following principles, which were prepared in broad cooperation and have, for the most part, already been successfully implemented over a long period:

1. The transport system will be developed taking into account the needs of residents, businesses and other stakeholders so that it promotes social justice and primarily supports walking, cycling and public transport and, subsequently, electric mobility.
2. Walking and cycling will be promoted while strengthening biodiversity and the health and well-being of residents.
3. Transport infrastructure will be planned and built in the most low-carbon manner possible, while safeguarding local nature and ensuring that carbon sinks are not reduced.
4. Climate risks will be taken into account and prepared for in the planning, development, construction and maintenance of the mobility system.
5. Turku will strive to actively reduce transport poverty by improving the affordability and accessibility of essential mobility, especially for vulnerable households and people.
6. Government steering instruments and measures, such as the level of the distribution obligation, support the achievement of Turku's targets and are essential for meeting them. Through active cooperation and advocacy, Turku will seek to ensure that these measures are implemented.

Development targets

The mobility-related development targets prepared in broad and long-term cooperation are:

Emission reductions

- Emissions from road and street transport will be reduced by at least 50% by 2029,
- at least 75% by 2035, and
- at least 90% by 2040 compared to the level in 2015.
- Public transport will be developed so that it is carbon neutral by 2029.
- Turku City Public Transport Ltd will be carbon neutral from 2025 onwards.

Strengthening sustainable modes of transport

- The city will strive to increase the share of sustainable modes of transport to 66% of trips made in the City of Turku by 2030 (the share was 55% in 2021).
- The targets for sustainable modes of transport are also included in the Turku Master Plan, the land use strategy for the urban area (structural model 2035 Turku city regional strategic land use plan) and the Climate Plan.
- The number of trips made in public transport will increase by 5–10% each year until 2029.
- Föli buses used for public transport in Turku and regional public transport will run on electricity or biofuel.
- Construction of the tramway (operations are expected to begin in 2033) will significantly strengthen the share of sustainable mobility and the conditions for sustainable mobility.
- Turku City Group will be sustainable in terms of mobility.

Reducing transport poverty

- Turku will reduce transport poverty by 2029 and this work will continue towards 2035 and 2040 by improving the affordability and accessibility of essential mobility, especially for vulnerable households.
- By 2029, transport poverty in Turku will be reduced so that the share of households experiencing transport poverty decreases from the current 4.5% to 4.0%.
- By 2040, the aim is to reduce the share of households experiencing transport poverty to half of the current level.

Mobility measures

The measures targeting mobility were compiled through collaboration involving a large expert group consisting of key persons from the city, the Group and partners. Some of the measures are in progress and some are continuous by nature. There are also new measures and ongoing measures that have undergone further development or still require development. In accordance with the model for continuous development of climate action developed and applied by the City of Turku to implement its climate

work, measures are continuously being examined, prepared, introduced, evaluated and further developed.

The measures presented in the table have a significant impact on mobility targets, but the list is subject to continuous updating and steering. The measures as a whole are not approved by a single decision but are managed through annual steering, investment plans, Group steering, development projects and cooperation.

Measures: Sustainable low-carbon mobility	Responsible parties City of Turku and other actors
IMPLEMENTATION OF SUSTAINABLE MOBILITY PROGRAMMES, PLANS AND POLICIES	
The effective implementation of Turku's cycling development programme 2029 and Turku's development programme for walking and spending time 2029 will be strengthened to support an increase the share of cycling and walking in the modal split. Sufficient resources will be ensured for implementing the programmes and updating them as planned.	City of Turku / Urban environment / Strategic steering, mobility services, Transport planning, city planning, Urban construction and facilities
Effective implementation of the City of Turku's Sustainable Urban Logistics Plan (SULP) will be strengthened. Sufficient resources will be ensured for implementation.	City of Turku / Urban environment / Strategic steering, mobility services
The target network for cycling in the city centre 2035 approved by the Turku City Board will be implemented annually in a goal-oriented manner.	City of Turku / Urban environment / Strategic steering, city planning, mobility, Transport planning, mobility services, Urban construction and facilities
Parking guidelines and instructions for dimensioning of parking will be implemented in a goal-oriented manner that supports growth in sustainable modes of transport. Policies and dimensioning guidelines will be updated as necessary, and sufficient resources allocated for their implementation.	City of Turku / Urban environment / Strategic steering, city planning, Transport planning, Building control
Implementation of the City of Turku's Sustainable Urban Mobility Plan (SUMP) will be strengthened: measures will be scheduled, responsibilities assigned and monitored, and the plan will be updated if necessary. Sufficient resources will be allocated for coordination and systematic implementation of the work.	City of Turku / Urban environment / Strategic steering, mobility services, Transport planning, city planning and other relevant areas of responsibility (Urban environment)
The Climate Plan targets, promotion of sustainable mobility and emission reduction throughout the region will be taken into account when preparing and implementing the Turku city regional strategic land use plan 2050 and developing the transport system. Turku will have a strong role in promoting regional cooperation and accelerating the reduction of regional emissions.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Transport planning, mobility guidance, Urban construction and facilities
Urban and transport planning methods will be utilised to promote opportunities for sustainable mobility as part of the everyday lives of all Turku residents.	City of Turku / Urban environment / Strategic steering, Transport planning, mobility services, city planning
Sustainable mobility will be promoted and the need for mobility reduced by systematically taking the sustainable mobility perspective into account in the location and accessibility of private and public services (including outsourced services).	City of Turku / Collaborative steering, service network, Placement services, city planning

CONDITIONS FOR SUSTAINABLE MOBILITY

The conditions for sustainable mobility will be improved and the safety, comfort and healthiness of the city centre, regional centres and residential areas will be increased by means of the following measures:

- The street space in the city centre will be divided in order to clearly increase the space available for walking and spending time, bicycle traffic and public transport. The city will work with residents to find and test solutions suitable for Turku and subsequently implement the measures proposed in the Sustainable Urban Mobility Plan for reducing car traffic in and through the city centre, which will enliven the urban space and increase well-being, comfort, health and safety.
- A street network hierarchy (main network and local network) will be prepared that enables Low Traffic Neighbourhoods, a reduction in transit traffic and the designation of street areas as spaces for walking, cycling and living.
- The number of residential areas where the speed limit has been reduced to 30–40 km/h will be increased.
- The city will actively communicate about the vision and priorities for using the urban space to different stakeholders.

City of Turku / Urban environment / Strategic steering, mobility services, Transport planning, other relevant areas of responsibility, Urban construction and facilities, Communication and marketing services

A safe and pleasant traffic environment that allows children to make trips to school and hobbies on foot and by bicycle will be ensured. The amount of car traffic in school environments will be decreased. Travel chains and services will be developed to support the use of public transport among children.

City of Turku / mobility services, Transport planning, Urban environment / other relevant areas of responsibility, Urban construction and facilities, Communication and marketing services, Children and Young People / teaching and schools

The conditions and services for sustainable mobility will be significantly improved during all seasons, including the safety, lighting, comfort and adequate winter maintenance of cycling and pedestrian routes, public transport stops and routes leading to the stops as well as safe covered bicycle storage spaces and electric bike charging points.

City of Turku / mobility services, Transport planning, city planning and Urban environment / other relevant areas of responsibility, Urban construction and facilities

The attractiveness of walking and cycling will be increased by focusing on smooth pedestrian and cycling routes, urban nature along the routes and utilising green spaces as part of the routes.

City of Turku / mobility services, Transport planning, city planning and Urban environment / other relevant areas of responsibility, Urban construction and facilities

Exceptional city traffic arrangements will be implemented in a way that favours public transport, walking and cycling and ensures that these modes of transport are safe and smooth. The parties planning and implementing exceptional arrangements will be guided in this direction and sufficient resources allocated for monitoring compliance with the guidelines.

City of Turku / mobility services, Transport planning and Urban construction and facilities

PUBLIC TRANSPORT	
Public transport lanes and traffic control benefits will be implemented for the most important routes into the city and the city centre area by 2029.	City of Turku / Transport planning, Föli and Urban construction and facilities
In accordance with the City Council decision of 18 May 2026, a high-capacity public transport system will be implemented as a tramway located in the Varissuo-City Centre public transport corridor as outlined in the Mayor's Programme. The arrangements required for a high-capacity solution will be ensured and the impact of the system on strengthening the sustainability transition in mobility will be maximised.	City of Turku / Urban environment Urban development, land property, city planning, transport planning, Föli and Urban construction and facilities Other actors / Tramway Alliance or other consortium or project organisation
Development and improvement of the trunk line network will continue.	City of Turku / Föli, Urban development, Transport planning, city planning, Urban construction and facilities
The role of public transport as part of travel chains (including mobility points where it is easy to switch between modes of transport) will be strengthened. The Turku transport hub will be implemented and its strong role in promoting sustainable mobility ensured.	City of Turku / Föli, Urban development Transport planning, city planning, Urban construction and facilities
The role of commuter train transport as part of smooth and sustainable travel chains will be promoted.	City of Turku / Urban Environment, Strategic steering, Transport planning, city planning, Urban construction and facilities
Cooperation between Föli and large workplace clusters will be increased when planning timetables (e.g. shift work).	City of Turku / Föli, Transport planning, mobility services
The public transport service will be complemented with, for example, demand-responsive and automated transport in areas on the outskirts of the public transport network and routes where service is sparse.	City of Turku / Föli, mobility services, Procurement services
The selection of ticket products will be developed and maintained (including ticket products shared by different transport services), digital services and real-time passenger information. The city will actively communicate about public transport services.	City of Turku / Föli, mobility services, Communication and marketing services
Measures to achieve carbon neutral public transport in 2029 will continue.	City of Turku / Föli, Transport planning, Urban development, city planning, Urban construction and facilities, Procurement services Other actors / Turku City Public Transport Ltd, operators
Cooperation with the Government will be increased in order to implement key railway projects (West Railway, Tampere-Turku-Naantali connection).	City of Turku / advocacy, Urban development, Transport planning, mobility services, city planning

WALKING AND CYCLING	
The city will encourage residents to engage in active daily and leisure-time physical activity and communicate about the impacts that walking and cycling have on well-being and health.	City of Turku / mobility services, Communication and marketing services
The city bike offering will be expanded and diversified, taking into account its year-round nature and the possibility of offering electric bikes.	City of Turku / mobility services, Föli
REDUCING EMISSIONS FROM PRIVATE CAR USE	
Parking benefits and charging opportunities for electric cars will be introduced in cooperation with actors in the area.	City of Turku / Transport planning, city planning, Urban construction and facilities
The offering of emission-free shared-use vehicles will be actively promoted.	City of Turku / mobility services
TURKU CITY GROUP ACTIVITIES	
As a rule, the vehicles procured for the city and Turku City Group subsidiaries are always electric and operate on renewable energy sources. The existing fossil fleet will be replaced in an accelerated manner.	City of Turku / Procurement services, Corporate governance Other actors / Turku City Group subsidiaries that procure vehicles
The procurement criteria for transport services require the use of vehicles that are electric and operate on renewable energy.	City of Turku / Procurement services, Corporate governance Other actors / Turku City Group subsidiaries that procure vehicles
Turku City Group personnel will be trained regarding how the activities of each city unit affect the mobility solutions of city residents. The promotion of sustainable mobility will be included in the plans and guidelines of each unit and service area.	City of Turku / mobility services
Offices of the city and Turku City Group will encourage the use of sustainable modes of transport, focus on improving the conditions for active commuting, and promote the introduction of electric company bikes. The use of public transport will be encouraged with an employer-subsidised travel ticket. Staff parking will be reduced and a parking fee introduced.	City of Turku / mobility services, Human resources services
Charging points for electric cars and electric bikes will be implemented in city properties, contributing to the formation of a wider service network for electric charging.	City of Turku / Urban construction and facilities

WATERBORNE AND AIR TRANSPORT

The city will actively influence the strengthening of low-carbon travel chains and services in tourism in the archipelago and throughout Southwest Finland.	City of Turku / Urban development, mobility services Other actors / Visit Turku Archipelago
Turku City Group will support the transition to low-carbon sea and air transport in cooperation with actors in the industry and take the climate perspectives of mobility into account in the city's marketing.	City of Turku / Climate, nature, and circular economy, mobility services, Communication and marketing services Other actors / Port of Turku, Turku Airport (Finavia), Viking Line and other shipping lines, Meyer Turku, Meriaura, Turku University of Applied Sciences
The introduction of shore power in the port will be expanded. The target of a fossil-free maritime corridor between Turku and Stockholm by 2035 will be promoted.	City of Turku / Climate, nature, and circular economy, Urban environment / mobility services, Urban construction and facilities, Building control Other actors / Port of Turku, Viking Line, other shipping lines, Ports of Stockholm and Mariehamn, Turku Energy and other energy suppliers (also in Mariehamn and Stockholm)

LOGISTICS

Implementation of the Green Deal agreement on emission-free work sites will be strengthened and Turku City Group subsidiaries encouraged to participate through their own measures.	City of Turku / Climate, nature, and circular economy, Urban construction and facilities
The transition to emission-free transport services will be promoted in cooperation with industry actors.	City of Turku / mobility services, Procurement services Other actors / Turku City Group subsidiaries that procure transport services
The development and deployment of new, emission-free and innovative logistics solutions (e.g. drones, robots) and fuels (including hydrogen) will be supported through projects, piloting and corporate and research collaboration.	City of Turku / mobility services, Procurement services Other actors / Turku University of Applied Sciences, Business Turku, Turku City Group subsidiaries that procure transport services

MOBILITY AS A SERVICE	
The development and implementation of Mobility as a Service concepts will be increased. The city will increase cooperation with businesses and facilitate the role of innovative companies and actors as service developers.	City of Turku / mobility services
STRENGTHENING THE KNOWLEDGE BASE AND USABILITY	
An annual report on the modal split will be prepared so that measures can be strengthened and focused if necessary to ensure the desired development.	City of Turku / Urban environment / Strategic steering
Up-to-date mobility information will be displayed and communicated to residents.	City of Turku / Urban environment / Strategic steering, mobility services, Transport planning
An electronic and open situational awareness service for traffic data will be implemented to collect essential information in a single location.	City of Turku / Urban environment / Strategic steering, mobility services, Transport planning
TRANSPORT POVERTY	
The city will strengthen the affordability and accessibility of public transport by, for example, developing ticket products, service level and trunk connections and ensuring that the conditions for walking and cycling support affordable everyday mobility.	City of Turku / Urban environment / Strategic steering, Föli, city planning, Transport planning, Urban construction and facilities
Turku will coordinate land use, the service network and the transport system so that workplaces, education and key services are accessible without unreasonable mobility costs.	City of Turku / Urban environment / Strategic steering, Föli, city planning, Transport planning, Urban construction and facilities, Collaborative steering / Service network management

7. Sustainable urban structure and construction

Overview of sustainable city development

In the 2010s and 2020s, the urban structure of Turku and the surrounding functional urban area has mainly developed in accordance with the jointly set sustainability targets. Turku is a relatively compact city with good conditions for sustainable mobility and energy system. Turku also has the lowest emission per capita among large cities in Finland. Emissions from the entire urban region have decreased significantly, and in Turku they have decreased faster than in any other Finnish city. Climate and sustainability targets have been successfully promoted in Turku's own development and throughout the functional urban region through cooperation and programmes on land use, housing and transport.

Turku is currently experiencing a period of strong growth, and this is expected to continue in the coming decades. This growth means that a large number of new buildings are being built in the city, and density will increase especially along the future tramway route. The ongoing development creates opportunities for the city and its structure, but this also highlights the need to reconcile green spaces, nature values and livability with the increasingly dense structure. Sustainable low-carbon construction and the application of resource-wise circular economy principles create opportunities to reduce the carbon footprint caused by city growth.

When reconciling growth and sustainability targets, it is critical for development and construction of urban structure to also actively promote the achievement of climate, nature and circular economy targets. New construction must be built in a low-carbon and sustainable manner that preserves existing structures, takes long-term needs into account and ensures greenness, biodiversity, accessibility and a stronger sense of community as the urban structure becomes denser. This is already being implemented through measures such as climate impact assessments in urban planning, the introduction of the 3-30-300 principle outlined in the Mayor's Programme, the sustainability assessment of investments in the city's own projects, and high environmental standards for new construction.

The city structure and construction play an important role both in achieving emission targets and in climate change adaptation. From the perspective of climate

resilience, safeguarding biodiversity and ecosystems is essential: effective, impactful measures must be taken to protect and restore nature (see also Biodiversity and carbon sinks).

A key steering tool for reconciling investments and construction related to the city's growth with climate, nature and sustainability targets is climate and sustainability budgeting, which is included in the Turku City Group's management, financial control and action plan, and which guides the city's investments to implement sustainability targets and promotes sustainable resource use, the green transition and the utilisation of green financing. All Turku City Group investments of more than EUR 1 million are assessed and steered using the criteria for climate change mitigation and adaptation, circular economy and impacts on nature and water systems, applying the EU taxonomy for sustainable financing (Image 12). Climate and sustainability budgeting is described in more detail earlier in Chapter 2. Climate Plan steering and implementation principles.



Image 13. The Taito campus is designed to be energy efficient and adaptable, and the plot improves the biodiversity of urban nature. Upon completion, it will be one of the first educational institutions in Turku to have achieved a four-star rating in Rakennustieto's Environmental Classification.

A high environmental classification (YL4) and the use of sustainability criteria based on the EU taxonomy in design helped the site in receiving a green financing loan benefit. This means that the city saves more than EUR 100,000 annually on interest costs.

Regional cooperation is a challenge and an opportunity

Achieving the City of Turku's climate targets requires sustainable development of the urban structure throughout the functional urban region. Urban structure has impacts on emissions from energy and mobility, climate change adaptation, the green network and biodiversity, as well as on possible placements of green businesses in the area. Strong regional cooperation determines the development of energy production, water supply and public transport as well as the cohesiveness of green networks in the region.

At the Turku city region level, sustainable development of the community structure is steered and advanced in collaboration with regional municipalities and the Government through the Turku city regional strategic land use plan as well as the MAL agreement (agreement concerning land use, housing and transport planning) and the plans, transport system work and transport system plan implementing it. The MAL agreement and related collaboration are an important tool for Turku and municipalities in the region in terms of consolidating development that supports carbon neutrality. Greenhouse gas emissions in the urban region are a key indicator of the impact of the MAL agreement and they have been calculated since 2015.

Guiding principles

The development of a sustainable urban structure and construction in Turku is guided by the following principles, which were prepared in broad cooperation and have, for the most part, already been successfully implemented over a long period:

1. Turku is active, takes initiative and shows leadership in developing the sustainability of the urban regional structure. Through its own actions, Turku advances climate objectives throughout the entire functional urban region.
2. Urban planning and construction are based on up-to-date researched information on climate and nature impacts. Data collection, openness and data utilisation are in constant development to ensure that decisions effectively support the achievement of an urban structure that enables a sustainable life. The city steers all construction in its area in a climate resilient and environmentally sustainable direction.
3. City planning and urban planning create and strengthen an urban structure that enables a sustainable life where urban green spaces and

biodiversity increase and services and green areas can be reached by walking, cycling or public transport. Resident orientation, healthy living environment and social equity are taken into account and solutions that reduce energy and transport poverty are being favoured.

4. Construction is based on a resource-wise construction hierarchy, encouraging renovation and circular economy principles. The existing building stock is maintained in a sustainable and proactive manner with demolition only used as a last resort. New construction is implemented with consideration in a way that takes into account life cycle sustainability, circular economy, adaptability and demolition.
5. Urban planning and construction prevent climate change and adapt to its impacts. Regional risks are identified and taken into account proactively with solutions that strengthen the resilience of the urban environment and the ability of green structures to absorb carbon and manage extreme phenomena.
6. The urban structure and construction measures correspond to climate and sustainability objectives in the long term, implementing resource-wise development towards carbon neutrality in 2029 and an emission-free, zero-waste and resource-wise city that uses resources sustainably in accordance with the City Strategy in 2040.

Development targets

The development targets for sustainable urban structure and construction prepared in broad and long-term cooperation are:

Sustainable urban structure in a growing city:

- Turku will plan and develop in a climate resilient manner that strengthens nature.
- As the urban structure becomes more dense, 85% of residential construction in the future will be planned in the densifying zone of sustainable urban structure in accordance with the city master plan.
- In 2040, Turku will be a city that is accessible by walking, cycling and public transport, where services, jobs, housing and leisure activities are located nearby or easily accessible without a car.

- Urban planning will aim for a cohesive and diverse urban structure that contains a mix of housing, services and workplaces.

Preserving the existing building stock and building sustainably:

- The existing building stock will be maintained sustainably and renovation projects carried out in a timely manner, thus extending the life cycle of the building. The building elements and materials from demolition sites will be utilised whenever possible.
- New construction will be carried out in a low-carbon manner that preserves nature, while continuously seeking new solutions, utilising circular economy solutions and reusing materials.
- Turku City Group investments of more than EUR 1 million will be implemented in accordance with the EU taxonomy and the criteria for green financing.
- Turku City Group's new facility construction projects will commit to at least the YL4 environmental classification level. Also residential construction aims for YL4 classification.

Turku aims to achieve carbon neutrality in the urban area by 2029, and to increase climate positivity towards 2035 (carbon neutrality in Finland) and 2040 (resource-wise Turku). At the same time, Turku is preparing for climate change as comprehensively as possible, and the city will be developed to increase its resilience to change. Changes in the urban region and structure will look beyond these target years, guiding long-term development towards a sustainable urban region and emission-free, zero-waste and sustainable use of natural resources in accordance with Turku's City Strategy in the 2040s.

As a regional centre, Turku leads the cooperation in the urban region, strengthens the shared vision and ensures that measures promote low-carbon mobility and sustainable urban structure in addition to strengthening the regional network of green spaces and forests and climate targets throughout the urban region.

Measures

The measures targeting urban structure and construction were compiled through collaboration involving a large expert group consisting of key persons from the city, the Group and partners, and they are based on the best available experience and researched information.

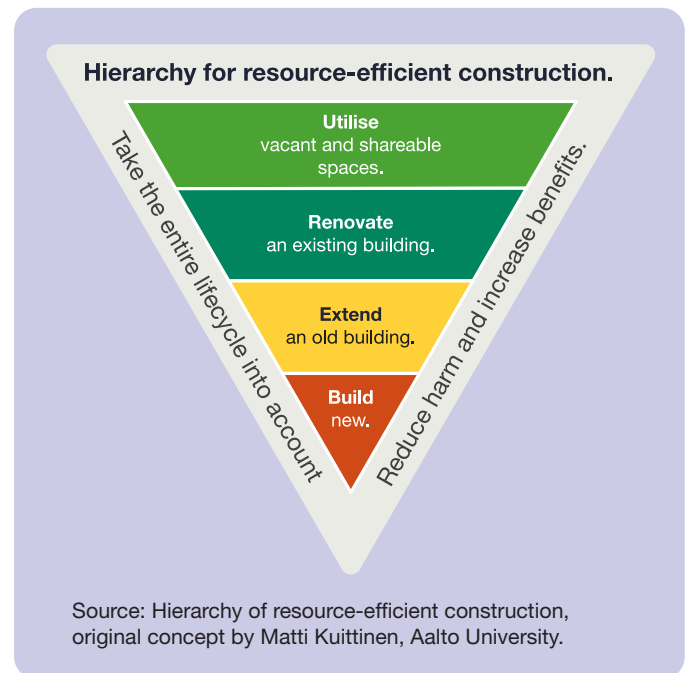


Image 14. Hierarchy for resource-efficient construction.

Some of the measures are in progress and some are continuous by nature. There are also new and ongoing measures that have undergone further development or still require development. In accordance with the model for continuous development of climate action developed and applied by the City of Turku to implement its climate work, measures are continuously being examined, prepared, introduced, evaluated and further developed.

The measures presented in the table have significant impacts on the targets for sustainable urban structure and construction, but the list is subject to continuous updating and steering. The measures as a whole are not approved by a single decision but are managed through annual steering, investment plans, Group steering, development projects and cooperation.

Measures: Sustainable urban structure and construction	Responsible parties City of Turku and other actors
SUSTAINABLE URBAN STRUCTURE	
The urban area will be developed in accordance with the objectives of the MAL Agreement and the Turku city regional strategic land use plan, strengthening sustainable mobility, the regional service network and green networks in the area. Turku will promote strengthening of the regional forest network and the preservation of forested areas as part of preparing and implementing the regional strategic land use plan.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Environmental protection, land property management, Collaborative steering / Service network management
Climate impact assessment and anticipation of climate resilience will be retained as a standardised part of land use planning, including low-carbon solutions and climate change adaptation.	City of Turku / Urban environment / Strategic steering, Urban development, city planning
Land use planning that involves construction in nature-sensitive and forested areas will be avoided, and construction directed to areas where the impacts on nature are minimised. Missing ecological corridors identified in the master planning work in regional cooperation will be implemented, and the existing urban structure developed in a greener direction. Master plan-specific obligations will be set for preserving existing forests and trees, and preservation of the natural environment for plants, trees and other organisms on the plot will be ensured in more detailed implementation planning. Planning regulations will be expressed in a clear and verifiable format.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Environmental protection Urban construction and facilities, Climate, nature, and circular economy
In order to increase liveability and greenness and prevent heat risks, the 3-30-300 principle will be introduced in all new plans within the densifying public transport zone. In addition, city planning will ensure a level of blue-green factor and blue-green infrastructure, canopy cover of trees and use of nature-based solutions that is adequate for biodiversity, stormwater management, cooling and comfort.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Environmental protection, Urban construction and facilities, Climate, nature, and circular economy
The possibilities of implementing car-free streets and blocks will be examined as well as large urban blocks or experiments to promote them in new and existing areas. Car-free areas and safe walking and cycling conditions will be created, especially near schools and early childhood education and care units. Nature-based solutions that enhance biodiversity will be implemented in play and physical activity environments (e.g. sand boxes with forest microbiome).	City of Turku / Urban environment / Strategic steering, Urban development, city planning, mobility services, Environmental protection Urban construction and facilities, Climate, nature, and circular economy, Children and Young People
In accordance with the master plan, new housing, jobs and services will be centrally located in the zone of sustainable urban structure and near good walking, cycling and public transport connections. City planning will prioritise projects targeting the existing urban structure and along the tramway route.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Urban construction and facilities

New and existing steering methods will be investigated and actively utilised to promote low-carbon and diverse construction that strengthens nature, reduces climate risks (e.g. planning regulations, plot transfer agreements, competitive tendering criteria, applied construction concepts and operating models). The use of financial incentives for taking climate and environmental objectives into account in plot transfer agreements will be examined.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Building control, Environmental protection, Urban construction and facilities, Climate, nature, and circular economy
A carbon footprint threshold value for buildings will be set for new city planning areas so that the carbon footprint is at least 10% lower than the national threshold value requirement in 2026. The level will be reviewed as the threshold values in legislation become stricter.	City of Turku / Urban environment / Strategic steering, Urban development, Building control, Urban construction and facilities, Climate, nature, and circular economy
The recycling and reuse of building materials will be promoted, for example, through planning regulations and plot transfer agreements, as well as by developing pilots and intermediate storage. The city will join the Circular Economy Green Deal and demonstrate ambitious climate and sustainability targets for land use, for example, by means of the plot transfer terms.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Building control, land property, Urban construction and facilities/ Climate, nature, and circular economy
When increasing the offering of detached houses, the development of areas with detached houses that are close to public transport will be promoted by creating incentives for renovating buildings and parcelling out plots. New construction of detached houses in connection with the existing city infrastructure and in areas with detached houses located near public transport routes will be emphasised.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Building control, land property, Urban construction and facilities, Climate, nature, and circular economy
Smooth and safe travel chains will be taken into account in urban planning and city planning, including easy and safe access to stops for different population groups, resident-oriented development and facilitating a sense of community.	City of Turku / Urban environment / Strategic steering, Urban development, city planning, Building control, land property, mobility guidance, Urban construction and facilities, Climate, nature, and circular economy
SUSTAINABLE CONSTRUCTION AND BUILDING STOCK	
MAINTENANCE	
The utilisation of demand-side flexibility and property-specific renewable energy production in the built environment will be increased and the overall benefits and impacts of decentralised energy production examined. The city will focus on reducing energy consumption. Real-time data will be utilised to optimise energy consumption and knowledge-based management of properties.	Urban construction and facilities, Turku Energia
The city will keep facilities that it manages in use with the highest possible utilisation rate. The city will facilitate the temporary, evening and weekend use of facilities.	Urban construction and facilities, Children and Young People, Sports Services, Business and economic development

RENOVATION AND NEW CONSTRUCTION	
The carbon footprint will be calculated and low-carbon solutions favoured in the city's renovation projects. In connection with project planning, the possibilities for recycling and reuse of materials and building elements will be examined and targets set for them.	Urban construction and facilities Urban environment, city planning, Building control
Material circulation will be taken into account when planning demolition, and the aim is to use selective deconstruction methods if the materials can be utilised. The possibility of loosening restrictions will be investigated in relation to improving material circulation in the city.	Urban construction and facilities, Urban environment, city planning, Building control
An energy certificate will be drawn up before and after renovation projects. In connection with renovation, the aim is to improve energy efficiency by 30% or to raise the site to energy efficiency class A in order to utilise green financing, except where this would not be feasible or possible from the perspective of overall sustainability or other special features (e.g. protection regulations). Renovations of suitable sites will be implemented in accordance with the YL3 environmental classification.	Urban construction and facilities, TVT asunnot, Turku Student Village Foundation, VASO
The City Group's new-build premises projects aim to achieve an YL5 environmental rating and are committed to achieving at least an YL4 rating. For residential construction, the target is to achieve an YL4 rating.	Urban construction and facilities, Kiinteistö Oy Turun monitoimitilat, TVT asunnot, Turku Student Village Foundation, VASO
The use of nature-based and other low-carbon materials will be emphasised in Turku City Group projects and planning regulations, plot transfer agreements and competitive tendering.	Urban construction and facilities, Kiinteistö Oy Turun monitoimitilat, TVT asunnot, Turku Student Village Foundation, VASO
New construction of residential and business premises buildings will be implemented in Turku City Group projects in a way that meets the eligibility criteria for green financing (Energy efficiency class A and a carbon footprint at least 10% lower than the national threshold value requirement. The level will be reviewed as the threshold values in legislation become stricter.)	City of Turku / Urban environment / Strategic steering, city planning, Building control, land property, Urban construction and facilities, Climate, nature, and circular economy, Kiinteistö Oy Turun monitoimitilat, TVT asunnot, Turku Student Village Foundation, VASO
Emissions from construction will be further reduced by developing and introducing harmonised procurement criteria, monitoring systems and operating models for working machinery, heating, electricity use and transport in accordance with the Green Deal agreement on emission-free work sites.	City of Turku / Urban environment / Strategic steering, city planning, Building control, land property, Urban construction and facilities, Climate, nature, and circular economy
INFRASTRUCTURE BUILDING	
The carbon footprint will be calculated for infrastructure construction projects and they will be implemented with the lowest possible life cycle emissions, taking into account the best available technologies to ensure functions that are critical to security of supply.	Urban construction and facilities, Climate, nature, and circular economy

The aim in all infrastructure construction is to use circular economy materials and preserve the natural environment. Solutions that reduce emissions and promote the circular economy will be actively sought (facilitation of intermediate storage and various pilots). Turku will join the Circular Economy Green Deal and set ambitious targets concerning, for example, the reuse of soil masses.	Urban construction and facilities, Urban environment / Strategic steering, land property, Building control, city planning, Climate, nature, and circular economy
Emissions from infrastructure building will be further reduced by developing and introducing harmonised procurement criteria, monitoring systems and operating models for working machinery, heating, electricity use and transport in accordance with the Green Deal agreement on emission-free work sites.	Urban construction and facilities, Urban environment / Strategic steering, land property, Building control, city planning, Climate, nature, and circular economy
The City of Turku's urban green spaces will be developed to be climate and ecologically sustainable by favouring a diverse variety of trees and habitats favourable to pollinators as well as fields, meadows and useful vegetation that are typical for local species. This will simultaneously strengthen biodiversity and reduce the risks associated with climate change. Sufficient resources will be reserved for the prevention of harmful invasive alien species. (see also measures for climate risk management and adaptation)	Urban construction and facilities, Urban environment / Infrastructure services, Permits and monitoring, Environmental protection
CLIMATE RISKS	
The climate risks associated with the Turku City Group's construction projects will be assessed during project planning as part of the investment sustainability assessment. Adaptation measures will be included in the project plan, and a separate climate risk assessment and specification of adaptation measures will be prepared as part of life cycle planning in projects with a value of over EUR 10 million.	Urban construction and facilities, Urban environment / Strategic steering, land property, Building control, city planning, Climate, nature, and circular economy, Resource steering, Financial services, Corporate governance Turku City Group subsidiaries (those implementing construction projects)
Sufficient stormwater management will be ensured and nature-based solutions and permeable surfaces prioritised when planning infrastructure and facility projects and plot modifications. The urban structure will take into account possibilities for protecting water bodies.	Urban construction and facilities, Urban environment / Strategic steering, land property, Building control, city planning, Environmental protection, Climate, nature, and circular economy
Adaptation targets, prioritised measures and common risk management practices will be specified for the service divisions. The documents that guide urban planning, implementation, maintenance and procurement will be updated to take into account preparedness for climate risks (see also measures for climate risk management and adaptation).	Urban construction and facilities, Urban environment / Urban planning and land property, Facility services, Infrastructure services
DEVELOPMENT PROJECTS	
Development projects and pilots that promote climate resilience and the circular economy as well as innovative solutions will be implemented for both new and renovation construction. The efficiency, usability and feasibility aspects of digital solutions will be examined.	Urban construction and facilities, Urban environment / Strategic steering, land property, Building control, city planning, Business and economic development, Climate, nature, and circular economy

8. Biodiversity and carbon sinks

Overview of nature targets and carbon sinks

Biodiversity and safeguarding ecosystems have a significant impact on climate change mitigation and adaptation at the local and global level. Climate change, on the other hand, will substantially accelerate biodiversity loss and cause significant ecological risks in the Turku region.

The 2022 Conference of the Parties to the UN Convention on Biological Diversity adopted the Kunming-Montreal Global Biodiversity Framework, the aim of which is to halt biodiversity loss and strive for nature positivity in 2030. The biodiversity framework sets a global conservation target of 30% for terrestrial, inland water, coastal and marine areas and a restoration target of 30% for degraded terrestrial and water ecosystems by 2030.

Approximately 10% of all species classified as endangered in Finland are found in the City of Turku area. Turku has a considerable responsibility for nature conservation both on land and in the Archipelago Sea, and nature also plays a major role in the pleasant, health and vitality of the area.

By decision of the City Board, Turku has signed the European Commission's Green City Accord, which means that the city commits to making significant progress in protecting and enhancing biodiversity (City Board 23.11.2020, section 508). Turku participates in European nature cooperation and joined the CitiesWithNature initiative on 4 January 2024.

The Turku City Board has approved the "Nature Positive Turku 2030" target (City Board 24.3.2025, section 81), according to which by 2030 the City of Turku's activities and other activities taking place in the Turku area as a whole will strengthen biodiversity rather than weaken it. This target is in line with the Kunming-Montreal Global Biodiversity Framework.

Supporting biodiversity also strengthens the city's carbon sinks, which is a prerequisite for achieving carbon neutrality in Turku. Increasing the carbon sequestration capacity of vegetation and soil is an efficient and cost-effective climate action that, when implemented successfully, also supports climate change adaptation and the health and well-being of city residents.

Nature benefits and crossover effects

Climate change mitigation and adaptation as well as increasing the circular economy and biodiversity support each other and the realisation of social justice. However, the goals may also have crossover effects that must be considered in decision-making, planning and implementation.

For example:

- + Biodiversity measures improve the attractiveness of walking and cycling and support sustainable mobility, health and well-being
- + Nature-based adaptation measures and cooling urban green spaces support biodiversity, health and well-being
- Large renewable energy projects cause fragmentation of habitats
- The use of bioenergy increases the pressure for logging and weakens biodiversity

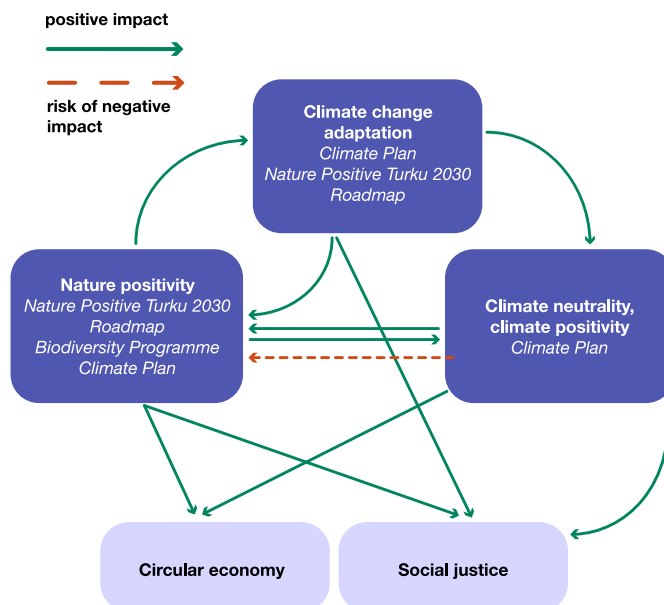


Image 15. Climate change mitigation and adaptation as well as increasing the circular economy and biodiversity support each other and the realisation of social justice.

The challenge of carbon sinks

The goal of the Climate Plan is to reduce emissions in Turku's urban area by 90% in 2029 compared to the 1990 baseline level. The remaining emissions will be absorbed by carbon sinks in Turku or outside the city area, or compensated through other offsetting measures.

- In 2029, the amount of carbon sinks and carbon offsets required will be approximately 140 kt CO₂-eq if the emission level is 90% lower than 1990 level.
- According to the scenario analysis, the measures outlined in the Climate Plan will achieve an emission reduction of 85% in 1990–2029, which means that the amount of carbon sinks and carbon offsets required to achieve carbon neutrality will be approximately 220 kt CO₂-eq.

The current state of carbon sinks within the City of Turku's boundaries is approximately 14 kt CO₂-eq per year.

- The estimated maximum annual potential of natural carbon sinks in the Turku area is 37 kt CO₂-eq (sum of emissions and sinks in the land use sector). To achieve this level, it will be necessary to reduce logging, implement measures in the city's own forests, support carbon sequestration on private land, for example through financial incentives, and implement climate actions on cropland.
- In addition to natural carbon sinks, technological carbon sinks can be implemented in the city area. These include the use of biochar, the capture and storage of bio-based carbon dioxide and carbon sequestration in concrete.

In addition to the natural and technological carbon sinks in the Turku region, achieving carbon neutrality and climate positiveness requires carbon sink measures and other offsetting measures implemented outside the city. To achieve this:

- Ecological compensation will primarily be implemented by maximising the carbon sinks, where permitted by the criteria of ecological compensation.
- Additional carbon sink measures and other offsetting measures will be implemented outside the City of Turku as part of cooperation between municipalities.
- If necessary, certified carbon credits that meet the set criteria will be purchased from reliable operators on the market.

The policies for supporting the growth of carbon sinks and other offsetting measures will be specified in a separate carbon sink plan that will be prepared by the end of June 2027.

Guiding principles for strengthening biodiversity and carbon sinks

Carbon sinks and nature-based solutions as well as the development of a nature city in Turku are guided by the following principles, which were prepared in broad cooperation and have, for the most part, already been successfully implemented over a long period:

1. The city increases its vitality, attractiveness, retention capacity and well-being by increasing biodiversity and carbon sinks in urban areas.
2. The existing knowledge base is used effectively and efficiently in urban planning to strengthen carbon sinks and biodiversity. The knowledge base is strengthened and kept up to date.
3. The measures in the Climate Plan in all sectors are implemented in a way that supports the nature positivity target and strengthens carbon sinks with particular attention to ensuring justice from the perspective of people and other species.
4. All residents, companies, communities and partners of Turku are encouraged to participate in strengthening carbon sinks and biodiversity.
5. Actions to increase biodiversity and carbon sinks are implemented to support climate change adaptation.
6. When strengthening biodiversity and carbon sinks, Turku also promotes regional cooperation to strengthen ecological networks.

Development targets

To achieve the carbon neutrality target for 2029, the residual emissions remaining after emission reductions will primarily be absorbed in natural carbon sinks located in the city of Turku in a way that supports nature positivity. The rest of the residual emissions will be absorbed in technological carbon sinks or compensated by additional carbon sink measures and other offsetting measures outside Turku. To achieve increasing climate positivity from 2030 onwards, carbon sinks within the urban area will offset a growing share of the area's emissions during each council term. In addition, the city will

assess the greenhouse gas emissions generated in coastal waters and take measures to reduce them.

Depending on the impact of emission reduction measures, the amount of residual emissions to be absorbed by carbon sinks and compensated through other ways is estimated to be 140-220 kt CO₂-eq in 2029.

The following hierarchy will be applied when addressing residual emissions, based on a comprehensive assessment of impact and cost-effectiveness.

1. Increasing the natural carbon sinks in the urban area in a way that supports the nature positivity target.
2. Additional carbon sink measures in connection with ecological compensation.
3. Implementation of technological carbon sinks in the city area.
4. Implementation of additional carbon sink measures and other offsetting measures outside the City of Turku (municipal cooperation model according to the Hinku – Carbon Neutral Cities criteria).
5. Procurement of certified carbon credits from outside the city.

Measures

The carbon sink and biodiversity measures in the Climate Plan were compiled through collaboration involving a large expert group consisting of key persons from the city, Turku City Group and partners, and they are based on the best available experience and scientific evidence.

Some of the measures are in progress, and some are continuous. There are also new measures and ongoing measures that have been further developed or are still under development. In accordance with the model for continuous development of climate action developed and applied by the City of Turku to implement its climate work, measures are continuously being examined, prepared, introduced, evaluated and further developed.

The measures presented in the table have a significant impact on carbon sinks and nature targets, but the list will be continuously updated and steered and other guidance documents also contain parallel nature-related measures. The measures as a whole are not approved by a single decision but are managed through annual steering, investment plans, Group steering, development projects and cooperation.

Measures: Biodiversity and carbon sinks	Responsible parties City of Turku and other actors
NATURE WORK	
The Nature Positive Turku 2030 Roadmap specifies the measures and parties responsible for achieving nature positivity so that they also support climate change mitigation and adaptation.	Climate, Nature, and Circular Economy, Environmental Protection and participants in the Nature Positive Turku 2030 Roadmap work (Urban Environment, Urban Construction and Facilities, others)
Ecological corridors will be maintained and strengthened through cooperation across municipal borders.	Urban Environment / Strategic Steering, Urban Development (Urban Planning), Environmental Protection, Urban Construction and Facilities, Climate, Nature, and Circular Economy
In addition to Turku Group, residents, businesses, communities and private landowners will be motivated and encouraged to implement the nature city target through communication, participation and cooperation, while also experimenting and developing new methods of dialogue.	Climate, Nature, and Circular Economy, Urban Environment, Strategic Steering, Environmental Protection, Urban Development, Urban Planning and Land Property, Communication and Marketing Services

LAND USE AND GREEN AREAS	
The key steering documents for urban planning, implementation planning and maintenance (e.g. general planning principles, procurement instructions) will be updated to include guidelines that promote biodiversity and carbon sinks.	Urban Environment, Urban Construction and Facilities
Urban green space will be expanded, developed and maintained to strengthen biodiversity and ecological corridors, and to ensure that they support the well-being, health and comfort of different population groups in the city and also encourage physical activity. Efforts will be made to preserve existing green areas and to increase urban nature and landscaping as the urban structure becomes more condensed and expands.	Urban Environment/ Urban Planning and Land Property, Urban Construction and Facilities/ Infrastructure Services, Maintenance of Street Environment and Urban Runoff Management, Maintenance of Park and Recreation Environment Sports / e.g. Pihalla working group
Guidelines and an implementation model will be created for nature-positive growth in Turku. As part of this work, a thematic review of the master plan will be performed from the nature and carbon sink perspectives.	Urban Environment / Strategic Steering, Urban Development, Urban Planning and Land Property, Business and Economic Development, Climate, Nature, and Circular Economy
The growth and preservation of carbon sinks will be guided through city planning, the building code and plot allocation conditions terms. A plan symbol for carbon sink areas will be introduced.	Urban Environment, Urban Construction and Facilities, Urban Planning and Land Property, Environmental Protection
INCREASING CARBON SINKS AND BIODIVERSITY IN CITY-OWNED LAND AREAS	
Existing forests will be managed sustainably in a way that maximises the carbon sink while prioritising biodiversity and recreational use in accordance with a regularly updated forest management plan. Deciduous trees will be increasingly favoured when renewing forests as part of climate change adaptation and measures implemented to enhance biodiversity.	Urban Construction and Facilities, Infrastructure Services / Maintenance of Park and Recreation Environment
Carbon sinks will be grown by increasing forest property through land purchases and afforestation of suitable sites, taking into account the impacts on biodiversity, the ecological network, landscape values and recreational use. Special areas include peatlands that can be restored to increase carbon sinks and for ecological compensation.	Urban Environment / Urban Planning and Land Property Urban Construction and Facilities Infrastructure Services / Maintenance of Park and Recreation Environment
New lease agreement provisions will be developed to promote the adoption of carbon farming principles and best practices, such as the use of structure lime, gypsum, and biochar, as part of the management of municipally owned agricultural land. These requirements will be incorporated into the lease terms of new agreements.	Urban Environment / Urban Planning and Land Property
INCREASING CARBON SINKS ON PRIVATELY OWNED LANDS	
Land and property owners will be offered advice and guidance on sustainable forest management (incl. carbon sinks, climate change adaptation, biodiversity) and maximising the carbon sink of forests and other land areas, and they will be engaged in achieving carbon sink targets. Land and property owners will be inspired through communications, campaigns and good practices (e.g. the city's own actions).	Business and economic development / Climate, Nature, and Circular Economy Other actors: Valonia, Aurajokisäätiö foundation, Forest Centre, Central Union of Agricultural Producers and Forest Owners (MTK), BSAG, ProAgria

Incentives for private landowners to increase their carbon sink (e.g. financial compensation, benefits) will be developed and communication will take place together.	Business and Economic Development / Climate, Nature, and Circular Economy Other actors: Valonia, Forest Centre, Central Union of Agricultural Producers and Forest Owners (MTK)
INCREASING CARBON SINKS OUTSIDE TURKU	
The possibilities and practices for recognising carbon sink units as part of ecological compensation projects will be investigated. Ecological compensation will primarily be implemented so that it also strengthens carbon sinks and produces additional carbon offsets for the city's use when this is possible under the ecological compensation criteria.	Urban Environment: Urban Planning and Land Property Business and Economic Development: Climate, Nature and Circular Economy
Additional projects to increase carbon sinks and reduce emissions from the land use sector will be implemented in other municipalities so that Turku can use them to compensate for its residual emissions as agreed in accordance with the principles developed in the Kuntanielu (Municipal sink) project and the HINKU criteria.	Business and Economic Development: Climate, Nature, and Circular Economy
INVESTMENTS AND PROCUREMENT	
Investments will be guided and steering developed to strengthen carbon sinks and biodiversity in the Turku area.	Central Administration / Financial Services, Business and Economic Development / Climate, Nature, and Circular Economy, Urban Environment, Environmental Protection, Urban Planning and Land Property
The actors responsible for the city's investments and procurements receive support and training related to fostering and strengthening carbon sinks and biodiversity.	Business and Economic Development/Climate, Nature, and Circular Economy, Urban Environment / Strategic Steering
COOPERATION	
Turku will continue to participate in the activities of CitiesWithNature and other key international networks and promote international biodiversity targets.	Business and Economic Development / Climate, Nature, and Circular Economy
Turku will actively participate in projects that strengthen carbon sinks in municipalities. Turku will monitor and participate in the development of new nature-based and technological solutions suitable for carbon sequestration and strengthening biodiversity, and develop cooperation with its stakeholders.	Business and Economic Development: Climate, Nature, and Circular Economy Urban Environment
Turku will cooperate with businesses to strengthen carbon sinks and biodiversity in ways that support the sustainability targets of the businesses. The city will provide companies and communities with information on effective, concrete measures and their costs.	Business and Economic Development / Climate, Nature, and Circular Economy
SOIL AND COASTAL WATERS	
Factors affecting greenhouse gas emissions and the carbon sink in coastal waters will be identified and measures planned to reduce emissions and strengthen the carbon sink.	Urban Environment / Environmental Protection, water protection Other actors: Turku University of Applied Sciences

Understanding will be increased and information shared concerning soil health and the role of wetlands in strengthening carbon sinks and climate change adaptation and controlling greenhouse gas emissions from waters. Cooperation to improve soil health and foster wetlands will be increased throughout the catchment area.	Urban Environment / Environmental Protection, Business and Economic Development / Climate, Nature, and Circular Economy Other actors: Valonia, Baltic Sea actors, BSAG, Aurajokisäätiö Foundation
TECHNOLOGICAL CARBON SINKS	
The use of biochar will be increased in green areas and the scope of its use expanded in Turku. Methods will be developed to monitor the usage volumes annually. The development of biochar production will be promoted in the Turku area.	Urban Construction and Facilities/ Maintenance of Park and Recreation Environment, Business and Economic Development / Climate, Nature, and Circular Economy Other actors: Kuntec Oy
Sites for carbon capture and storage will be identified by means of technological methods (e.g. CCS, DAC) and their introduction supported by bringing together local businesses and providers of carbon capture solutions.	Business and Economic Development / Climate, Nature, and Circular Economy
CARBON CREDITS	
The city will purchase certified climate credits that meet the set criteria from producers to compensate for the city's residual emissions. Domestic actors will primarily be utilised.	City of Turku
KNOWLEDGE BASE	
The knowledge base supporting the increase of carbon sinks and biodiversity will be strengthened, including the knowledge regarding areas suitable for afforestation and tree planting and areas where preservation is particularly important due to their carbon sink potential. The knowledge base will be improved concerning the extent and status of natural ecosystems and the services they produce, as well as the impacts of the city's activities on the health of ecosystems.	Urban Environment / Environmental Protection Urban Construction and Facilities / Maintenance of Park and Recreation Environment Other actors: University of Turku, Turku University of Applied Sciences, Åbo Akademi University, other research institutes
The availability, clarity and use of information needed to strengthen biodiversity and carbon sinks will be developed in the city organisation.	Business and Economic Development/Climate, Nature, and Circular Economy, Urban Environment/ Environmental Protection
Monitoring and indicators for biodiversity and carbon sinks will be developed so that achievement of the targets can be monitored.	Business and Economic Development / Climate, Nature, and Circular Economy, Urban Environment / Environmental Protection, Urban Construction and Facilities / Maintenance of Park and Recreation Environment

9. Climate risk management and adaptation

Towards a climate resilient city

In Turku, climate change adaptation and mitigation have been equal elements in the Climate Plan since 2018. As part of the Council-level Climate Plan, the policies and measures concerning adaptation are binding for the entire Turku City Group. In addition, adaptation measures have already been implemented and guided through various programmes, such as the stormwater programme, and as part of city planning and urban construction.

According to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, global warming of 1.5 degrees considered a safe limit in the Paris Agreement is about to be exceeded. In Finland, the impacts are visible as increasing extreme weather events and ecological changes at the local level and through global spillover effects.

Long and relatively warm summers and fairly short mild winters are typical of the climate in Southwest Finland. The warming effect of the sea means that autumn is often long and wet, while spring and early summer are dry and cool due to the cold sea. The impacts of climate change are reflected in long-term changes, such as increased precipitation, and sudden crises, such as floods. The impacts affect different areas of society and therefore have a wide-ranging impact on society as a whole. This is why climate change mitigation alone is not enough; it

is also necessary to adapt to and prepare for change in advance.

In Turku, the most harmful risks of climate change are related to floods, droughts, heat, soil risks and ecosystem changes. The risks to the life and health of city residents also increase as the likelihood of extreme weather events, such as prolonged heat waves, increases.

Efficient work towards adaptation not only increases resilience to cope with the impacts of climate change but also affects the quality of life of the population living in the urban environment, secures livelihood and well-being. Adapting to climate change is an inseparable factor in comprehensive security. The ability to recover from disruptions and damage caused by extreme weather events is an important part of adaptation. Adaptation requires regional cooperation in which the city and regional administration, residents, businesses and communities work together to strengthen Turku's climate resilience.

Vision for adaptation:

- Turku is a climate resilient city that ensures the well-being of its residents, biodiversity and livelihoods in changing climate conditions and has comprehensively prepared for sudden extreme weather events.

What are the impacts of climate change in Turku?

1. Risks related to water, water management and soil
2. Ecosystem changes and their impact
3. Risks related to heat and drought



Rainstorms



Urban floods



Storms



Sea floods



Ecosystem changes



Landslides and erosion



Heat and heatwaves



Drought and wildfires



Changes in the load-bearing capacity of clay soil

Images: Minna Kivimäki, Pixels and Pixabay

Image 16. Impacts of climate change on Turku.

Guiding principles and adaptation targets

Adapting to climate change requires consistent and proactive action across the city's planning and decision-making processes. The following principles guide Turku's climate risk management and adaptation towards an increasingly sustainable, safe and resilient city.

1. When preparing for climate risks, the city utilises the best possible existing knowledge effectively and efficiently in cooperation with regional partners and networks.
2. In accordance with life cycle approach, preparations for climate risks are proactive and ongoing at all stages of urban planning. The city prepares for both short-term and long-term climate impacts.
3. The city adapts to climate change in a socially just and inclusive manner by strengthening climate resilience, especially for the most vulnerable areas and residents. Adaptation measures also ensure sustainable living conditions for future generations.
4. Climate change adaptation involves utilising nature-based solutions, increasing urban green spaces and biodiversity, and enhancing carbon sinks.
5. Improving public safety and the well-being of residents is taken into account in all adaptation work, while preventing maladaptation.

The City of Turku's adaptation targets are based on the priorities outlined in the United Nations (UN) Sendai Framework for Disaster Risk Reduction 2015-2030. The targets for adaptation are:

1. **The City of Turku systematically develops the identification, assessment and monitoring of climate risks.** Regional risks and vulnerabilities are identified and taken into account in proactive preparedness, decision-making and planning.
2. **Climate risk management is strengthened** by integrating adaptation work across strategic management, financial planning and operative activities. Turku is a stable, long-term and reliable partner.
3. **Climate resilience in the region** will be strengthened by taking preparedness for climate risks into account in all investments. Ensuring the safety of the operating environment will im-

prove the vitality of the region and its socio-economic and environmental conditions.

4. **The city's disaster preparedness** will improve through cooperation with residents, businesses, communities and authorities. Jointly developed operating models will improve the city's ability to prevent and recover from disruptions.

Assessment of risks and vulnerabilities

Climate risks refer to potential direct and indirect harm to human activities, businesses and the environment caused by climate, weather and their development.

Factors affecting the formation of a climate risk include a physical hazard, exposure, vulnerability and adaptability, which is the ability to reduce vulnerability and exposure and to implement short-term preparedness and long-term adaptation measures. Adaptability plays a key role in reducing the risks associated with climate change (Diagram 11).

As part of the Climate Plan, a comprehensive Risk and Vulnerability Assessment (RVA) was carried out in accordance with the European cooperation framework (Covenant of Mayors). The analysis provides an overview of the climate risks that pose a threat to the City of Turku.

The risk analysis has now (8/2025–4/2026) been updated based on the latest national material, local reports and expert assessments*. The key material utilised for the updating work is presented in an annex (Background material for the Risk and Vulnerability Assessment). Climate risks were assessed based on the following factors, among others:

- Likelihood of occurrence (high, moderate, low)
- Level of risk and impact (high, moderate, low)
- Expected change in the intensity of the risk (increasing, no change, decreasing)
- Expected change in frequency (increasing, no change, decreasing)
- Timeframe (short-term, medium-term, long-term)
- Sectors affected by the risks
- Vulnerable groups of the population.

*The consultations regarding risks, vulnerabilities and impacts involved experts from the University of Turku, Turku University of Applied Sciences, Economic Development Centre, Well-being Services County of Southwest Finland, Valonia, Finnish Environmental Institute, the City of Turku and Second Horizon Advisory.

The identified and assessed risks are presented in Table 3. When assessing the level of impact of the risks associated with each climate hazard, the vulnerabilities and exposure factors were also considered.

The level of impact, together with the likelihood, thus determines the significance of the risk. More detailed descriptions of the most significant climate risks and their impacts are presented in the risk cards (Annex 6).

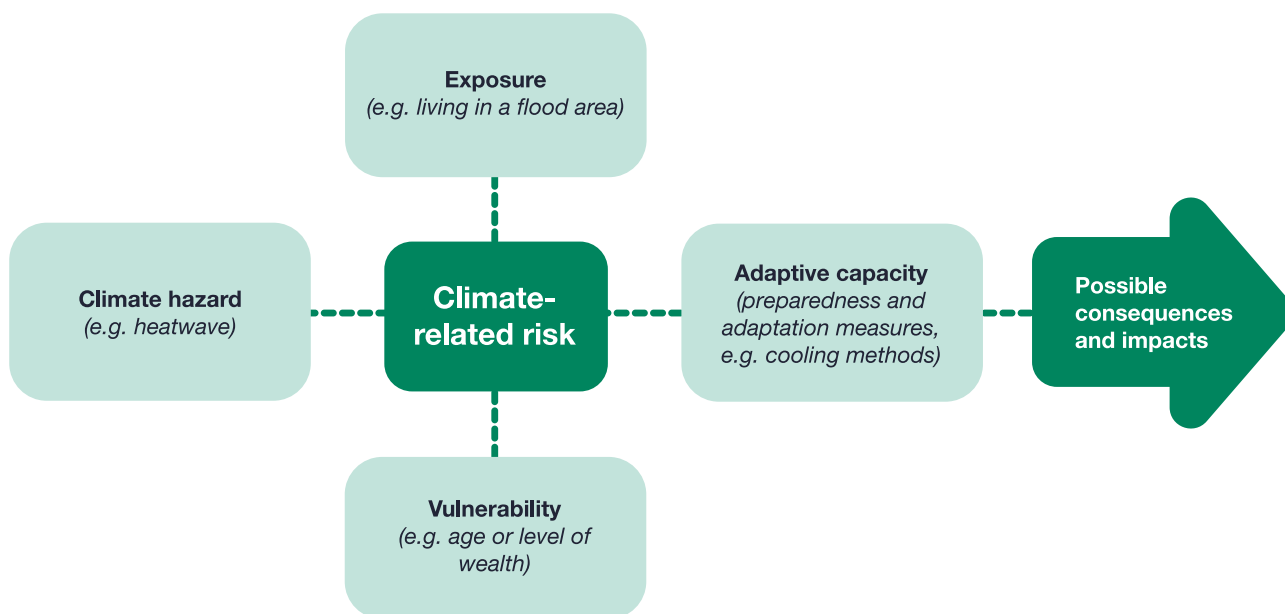


Diagram 12. Definition of climate change-related risks, according to IPCC 2012 and 2014 and the Finnish Government.

Table 3. Climate risks posing a threat to Turku as identified in the risk and vulnerability assessment, their estimated development and expert views on the reliability of estimation.

Climate hazard	Likelihood of occurrence	Impact level	Expected change in intensity	Expected change in frequency	Timeframe	Reliability of estimation	Risk card
Chronic heat stress	!!!	!!	increasing	increasing	long-term	***	RK1
Acute heatwave (individual hot days, heatwaves)	!!!	!!	increasing	increasing	short-term	**	RK1
Extreme cold	!	!	?	?	medium-term	*	
Chronic cold wave (incl. weakening of AMOC)	!	!!!	increasing	increasing	long-term	*	
Drought and scarcity of water	!!	!!	increasing	increasing	medium-term	*	RK2
Wildfires	!!	!!	increasing	increasing	medium-term	*	RK3
freezing-thawing cycle	!!!	!!	increasing	increasing	short-term	***	RK4
Rainstorms	!!!	!!!	increasing	increasing	short-term	***	RK5
Rain	!!!	!!	increasing	increasing	medium-term	***	
Snow	!!!	!!!	increasing	laskee	short-term	*	
Fog	!	!	increasing	increasing	short-term	*	
Hail	!	!	increasing	increasing	short-term	*	

! low, !! moderate, !!! high

increasing, decreasing, ?

short-term 20-30 years, medium-term 2050+,
long-term 2100s, ?
*low, **moderate, ***high

! low, !! moderate, !!! high increasing, decreasing, ? short-term 20-30 years, medium-term 2050+, long-term 2100s, ?
*low, **moderate, ***high

Climate hazard	Likelihood of occurrence	Impact level	Expected change in intensity	Expected change in frequency	Timeframe	Reliability of estimation	Risk card
Floods and rising of water level	!!!	!!!	increasing	increasing	short-term	**	RK6
Stormwater floods	!!!	!!!	increasing	increasing	short-term	***	
Sea floods	!!!	!!!	increasing	increasing	long-term	*	
Rising of sea level	!!!	!	increasing	increasing	medium to long-term	**	
River floods	!!	!!	increasing	increasing	short-term	***	
River erosion	!!!	!!	increasing	increasing	short-term	***	
Storms	!!!	!!	increasing	increasing	short-term	*	RK7
High wind	!!	!!	increasing	increasing	short-term	*	
Chronic changes in wind conditions	!	!	increasing	Increasing	medium-term	**	
Thunderstorms	!!	!!	increasing	increasing	short-term	*	
Soil erosion	!!	!!	increasing	increasing	medium-term	*	RK8
Soil degradation	!!	!	increasing	increasing	short-term	*	
Landslides and subsidence	!	!	increasing	increasing	long-term	*	
Changes in ecosystems	!!!	!!!	increasing	increasing	short-term	***	RK9
invasive alien species	!!!	!!!	increasing	increasing	short-term	***	
Biological climate hazards	!!	!!!	increasing	increasing	short-term	***	RK10
Waterborne diseases	!!	!!!	increasing	increasing	short-term	***	
Vector-borne diseases	!!	!!!	increasing	increasing	short-term	***	
Airborne diseases	!!	!!!	increasing	increasing	short-term	***	
Diseases spread by insects	!!	!!!	increasing	increasing	short-term	***	
Chemical changes	!	?	increasing	increasing	?	*	
Spillover effects	!!!	?	increasing	increasing	short-term	**	RK11

Vulnerabilities in the Turku region

Table 4 presents vulnerabilities in the Turku region that are linked to identified hazards. The vulnerable sectors are based on the definition used in the Climate Plan risk cards (Annex 6). The identification of vulnerable groups of people, habitats and species is based on international and national assessments and the city's expert work. It should be noted that some sectors, such as tourism, may also benefit from climate change.

Based on the risk and vulnerability assessment, three broader risk categories can be identified: risks re-

lated to floods and water management, risks related to heat and drought, and risks caused by changes in ecosystems. In addition, the risks include soil-related risks, where adaptation measures are still largely inadequate.

Risks related to floods and water management

Southwest Finland has one significant flood risk area: the coastal area of Turku, which has been designated due to the risk of seawater flooding. The flood risk area contains five sites that are difficult to evacu-

Table 4. Vulnerabilities identified in the Turku region.

Sectors affected by the vulnerabilities	Vulnerable groups of people	Vulnerable habitats and species
• Buildings • Transport • Energy • Water • Waste • Land use planning • Agriculture and forestry • Environment and biodiversity • Health • Rescue services • Tourism • Education • Information and communication connections	• Elderly people • People with chronic diseases • People with disabilities and intellectual disabilities • People receiving supported service housing • People with low income and poor socio-economic position • Homeless people • Infants and young children • Pregnant women • Foreign language speakers	• Water and wetland ecosystems • Coastal meadows and Baltic Sea shores • Built environment habitats • Herb-rich forests • Traditional biotopes (incl. meadows, fields, pastures) • Meadow and coastal lepidoptera • Meadow and coastal plants • Wetland and coastal birds • Species dependent on decaying wood • Lichens and mosses

ate, as well as food and pharmaceutical industry locations and sites with an environmental permit. In addition, new residential areas are being planned in the flood risk area. A very rare flood would cause an interruption in the distribution of electricity and heat, in telephone and road transport connections, and would disrupt the operations of the Port of Turku.

Climate change will increase annual precipitation. This is expected to rise by 6–10%. In other words, the average annual precipitation per year would be 530–610 mm in the outer archipelago and 630–820 mm in the inland area. Precipitation is expected to increase particularly in the winter, simultaneously increasing the risk of moisture in the built environment.

In addition to total precipitation, the intensity and frequency of individual rainstorms will increase. Rare, extremely intense rainstorms will also become more common: rainstorms that previously occurred once every 100 years may occur once a decade in the future.

The number of zero-crossing days will increase, causing more changes in the freezing-thawing cycle and increasing the risk of slipping. The changes also have an impact on, for example, maintenance needs for the road network.

Clay soils are sensitive to drought and rainstorms, which further affect water management, the durability of structures and the functioning of the urban environment. Winter precipitation and rainstorms increase river erosion and the collapse of stream banks, nutrient loading in water bodies and spikes in harmful substances. The most significant causes of landslides are slope gradient, as well as composi-

tion and water content of the soil. Longer periods of summer droughts and increasing precipitation in the autumn increase the risk of landslides in steep slope areas. Increasing winter rainfall and a lack of snow cover may increase the risk of landslides during winter. The risk of subsidence increases in connection with backfilling, especially in riverbank areas, if the soil structure is already poor.

The rising sea level may increase coastal erosion in larger areas than previously estimated. Changes in the Atlantic Meridional Overturning Circulation (AMOC) would lead to rising sea levels, which in Turku would emphasise the need to prepare for coastal floods more effectively.

Risks related to heat and drought

The impacts of the urban heat island effect will increase. The likelihood of exceptional heatwaves and individual hot days will increase, which may lead to overheating in buildings. High temperatures can cause significant health hazards. The risk of serious health hazards in hot weather is increased by conditions such as, cardiovascular diseases, chronic respiratory diseases, kidney diseases, diabetes, mental health and behavioural disorders and nervous system diseases, such as memory disorders. Heat worsens the symptoms of underlying diseases and increases mortality, especially in vulnerable groups. Heat stress can also cause fatigue and sleep problems, weaken concentration and increase susceptibility to accidents. In general, the cooling season will be longer and the need for cooling locations will increase.

The risks related to drought increase particularly in the summer. Agriculture and the food supply are especially susceptible to the challenges caused by ex-

tended drought. The impact of the warming climate on lengthening the harvest season compensates for crop losses caused by drought. Longer periods of drought may decrease the amount of groundwater in the summer and, at worst, cause water shortages. Long-term drought may also pose challenges to energy production at hydropower plants in Finland.

Long dry periods can affect the hydraulic conductivity of the soil: clay soils can become hard when dry, thus reducing their ability to absorb water during rainstorms. Clay soil can also crack during drought, causing tension in the structural frames and surfaces of buildings.

Risks related to ecosystem changes

The changing climate presents a challenge to the survival of local species as their habitats change. Fragmentation of green areas and land use increase changes in species and reduce biodiversity.

Human activities cause the spread of invasive alien species, which is further accelerated by climate change. Invasive alien species take over living space from local species, causing economic and social impacts. Climate change can also increase the im-

pacts on health as the habitats of insects spreading vector-borne diseases expand.

A coherent green network and the safeguarding of biodiversity and ecosystems have a significant impact on climate resilience.

Other risks and impacts

In addition to the risks occurring locally in Turku, risks caused by global change that would affect Turku if they were realised, were identified. For example, these included migration related to climate change, i.e. population migration due to slow or rapid environmental changes caused by climate change. If realised, the fact that this could affect segregation in the city should be considered.

Climate change can also trigger irreversible and rapid changes in the climate system. One of these tipping points is the potential weakening of the Atlantic Meridional Overturning Circulation (AMOC), which would have significant consequences for the climate in Northern Europe. If this weakening were to occur before major global warming, the collapse of the AMOC would lead to much colder weather conditions, especially during the winter.

Table 5. The most significant climate risk entities.

Key climate hazards related to water and water management include:	Key climate hazards related to heat and drought include:	Key climate hazards related to changes in ecosystems include:
• Rainstorms • Floods, especially stormwater and coastal floods • Changes in the freezing-thawing cycle • Soil erosion and waterlogged clay soil	• Prolonged period of heat and drought • Urban heat island effect • Drying of clay soil	• Changes in the set of species, biodiversity loss • Diseases and pests

More detailed descriptions of the climate risks considered to be most significant and their impacts are presented in the risk cards (in the annex). For the most significant risks, the risk cards include services and functions as well as key plans and policies in which the risk must be taken into account.

The updated assessment is part of the work to prepare for climate change and manage climate risks, and it strengthens Turku's efforts to be a responsible and leading climate city. This is partly achieved through the measures and plans already taken. The adaptation measures are planned and implemented by several of the city's services and functions as well as its partners. This work is ongoing.

Adaptation measures and monitoring

The measures targeting adaptation were compiled through collaboration involving a large expert group consisting of key persons from the city, Turku City Group and partners. Some of the measures are in progress, and some are continuous. There are also new measures and ongoing measures that have undergone further development or still require development. In accordance with the model for continuous development of climate action developed and applied by the City of Turku to implement its climate work, measures are continuously being examined, prepared, introduced, evaluated and further developed.

The adaptation measures are divided according to the priorities of the Sendai Framework and are designed to meet the adaptation targets described above. In addition, risk-specific objectives are:

- The City of Turku strives to reduce the impacts of heat and drought risks on residents' health, the built environment and urban nature.
- The city prevents flood risks and damage caused by floods.
- The city strengthens biodiversity, safeguards the functioning of ecosystem services and increases the ability of nature to adapt to climate change.

- Turku prevents soil degradation and erosion, manages the risks associated with pollution of the soil and ground bearing capacity, and ensures safe and sustainable land use in changing climate conditions.

The measures presented in the table have a significant impact on adaptation, but the list is subject to continuous updating and steering. The measures as a whole are not approved by a single decision but are managed through annual steering, investment plans, Group steering, development projects and cooperation.

Measures: Climate risk management and adaptation	Responsible parties City of Turku and other actors
UNDERSTANDING RISKS BY INCREASING CLIMATE INFORMATION	
A regional vulnerability assessment will be developed to understand the impacts of climate change risks. Simultaneously the needs for adaptation at the neighbourhood level and the impacts on vulnerable groups of people will be assessed. A cross-check of climate risks will be performed as part of the assessment. The Service Divisions will specify their own concrete adaptation targets and measures. A prioritised list of measures and areas will be prepared to outline the most acute and impactful adaptation measures that will be implemented first. As part of the work, attention will be focused on coordinating measures and planning between Service Areas and functions.	Business and economic development: Climate, nature and circular economy Urban Environment Urban Construction and Facilities Others: Rest of the city
The roles and division of responsibilities in adaptation work will be clarified in the city organisation in order to increase climate information and ensure the flow of information. The availability of up-to-date risk information will be ensured throughout the city organisation and that there is a shared situational picture.	Business and economic development: Climate, nature and circular economy Others: Rest of the city
Regional cooperation with key actors will be increased (e.g. Economic Development Centre of Southwest Finland, Regional Council of Southwest Finland, Valonia, Wellbeing Services County of Southwest Finland, regional rescue services, Turku Energia, water utilities, LJSH) and identify other actors that are essential in terms of climate change adaptation. The city will challenge municipalities in the region to participate in adaptation work.	Business and economic development: Climate, nature and circular economy Other regional actors
Close cooperation will continue with research institutes, higher education institutions and educational institutions in the region, and utilise their competence as a strength. Data production will be prioritised to focus on the most critical identified risks and identified information gaps, with consideration of regional climate risks.	Business and economic development: Climate, nature and circular economy; Central administration: Collaborative steering. Others: University of Turku, Turku University of Applied Sciences, Åbo Akademi University
Information on regional climate risks and adaptation and preparedness solutions in the Turku region will be actively disseminated to businesses, residents, communities and other partners in the region. Adaptation work will be more closely linked to the activities of climate partners and other networks.	Business and economic development: Climate, nature and circular economy

STRENGTHENING RISK MANAGEMENT

The implementation and coordination of the city's adaptation measures will be strengthened as part of climate policy steering and the management and operations of Service Divisions and Turku City Group subsidiaries.	Business and economic development: Climate, nature and circular economy Central administration: Collaborative steering, Corporate governance
To support planning work, a climate risk preparedness checklist will be prepared that focuses particularly on the risks affecting vulnerable groups and measures for risk management. The checklist will be integrated into existing documents.	Urban Environment: Urban planning and land property, Urban Construction and Facilities: Facility services, Infrastructure services Others: Well-being Services County of Southwest Finland
Climate-risk-sensitive areas are identified, where construction will be avoided or subject to particularly careful planning that takes climate risks and maladaptation into account.	Urban Environment: Urban planning and land property
The key guiding documents for urban planning and land property, urban construction, facility services and procurement will be updated so that they take into account the instructions concerning preparation for climate risks.	Urban Environment: Urban planning and land property Urban Construction and Facilities: Facility services, Infrastructure services Central administration: Resource steering
The city will strengthen cooperation with the Wellbeing Services County of Southwest Finland (Varha) to ensure that the needs of vulnerable groups are systematically taken into account in planning related to regional climate change adaptation and preparedness.	Business and economic development: Climate, nature and circular economy, Urban Environment: Urban planning and land property, Urban Construction and Facilities: Facility services, Infrastructure services Others: Wellbeing Services County of Southwest Finland, other municipalities in the region
The city's adaptation measures will foster its cultural heritage, such as buildings of cultural and historical value. The impacts of climate change will be taken into account in repair, renovation and maintenance work. The city will also raise awareness of climate risks affecting the physical cultural heritage and encourage actors in the region to adapt in ways that protect cultural heritage.	Urban Environment: Urban planning and land property, Urban Construction and Facilities: Infrastructure services, Facility services
Preparation for climate risks will primarily focus on nature-based solutions and strengthening the blue-green network whenever possible in light of local conditions and the nature of the risk, and utilising the opportunities of nature-based solutions when building an attractive city. Novel nature-based solutions will be actively developed and introduced.	Urban Environment: Urban planning and land property, Urban Construction and Facilities: Infrastructure services, Facility services
The green factor of the built environment will be improved. Fragmentation of green areas will be stopped by preserving and complement to green networks and by increasing ecological corridors and urban green spaces.	Urban Environment: Urban planning and land property, Urban Construction and Facilities: Infrastructure services, Facility services

STRENGTHENING RISK MANAGEMENT	
The societal benefits of proactive preparedness work will be identified and made visible. The safety, well-being, health, living environment and recreational benefits of adaptation will be identified and their impacts emphasised in decision-making, with a focus on cost benefits and regional economic impacts.	Business and economic development: Climate, nature and circular economy
The city will work to improve the resilience of regional food production and reduce the biodiversity footprint.	Business and economic development: Climate, nature and circular economy Central administration: Resource steering
The impact of adaptation measures will be monitored and evaluated as part of implementing the Climate Plan. This will enable continuous development and response to changing circumstances.	Business and economic development: Climate, nature and circular economy
Preparedness in water services will be developed together with partners to minimise and prevent the harm caused by prolonged periods of drought, ensure sufficient access to household water in exceptional situations and identify flood resilience and risks.	Urban Construction and Facilities: Infrastructure services Others: Turun Seudun Vesi Oy, Turun Vesihuolto Oy, Turun seudun puhdistamo Oy
STRENGTHENING RISK MANAGEMENT: Floods and water management	
Preparedness for stormwater floods in accordance with the stormwater programme. Sufficient resources will be reserved for implementation of the programme.	Urban Construction and Facilities: Infrastructure services
In major new city planning areas, the SSP2-4.5 (1/100a) sea flood scenario based on modelling by the Finnish Meteorological Institute will be utilised as the starting point in city planning and design solutions.	Urban Environment: Urban planning and land property, Urban Construction and Facilities: Facility services, Infrastructure services
Catchment area plans will be prepared to prevent urban flood risks, guide flood preparedness and reduce the load on water bodies.	Urban Construction and Facilities: Infrastructure services
Sufficient resources will be reserved for preventing slippery conditions and street dust.	Urban Construction and Facilities: Infrastructure services
The flood risk will be reduced, the impact of droughts mitigated and ecosystem resilience strengthened by reducing forest drainage and restoring drained mires in city-owned forests and by providing advice to private forest owners.	Business and economic development services: Climate, nature and circular economy

STRENGTHENING RISK MANAGEMENT: Heat and drought

A plan concerning preparation for heat risks will be prepared and the significance of green areas in reducing heat risks examined in connection with this process. The plan will pay particular attention to acute heat risks, in other words, prolonged periods of heat and individual hot days. Preparedness for heatwaves will be improved in cooperation with the Wellbeing Services County of Southwest Finland and third sector actors.	Business and economic development: Climate, nature and circular economy Urban Construction and Facilities: Facility services, Infrastructure services Urban Environment: Urban planning and land property Others: Wellbeing Services County of Southwest Finland, University of Turku, housing companies and organisations
Preparedness for heat risks will be promoted in the city's own construction and renovations in areas ranging from planning to implementation (e.g. orientation of buildings and windows, shadowing, yard planning, green structures).	Urban Construction and Facilities: Facility services Urban Environment: Urban planning and land property
Turku and its partners will develop climate resilient and energy-efficient solutions to meet the growing need for cooling and air conditioning in properties. The introduction of passive cooling methods will be promoted along with active cooling.	Urban Construction and Facilities: Facility services Others: Turku Energia, housing companies and organisations
The urban heat island effect will be tackled in new construction, infill construction and repair projects by preserving and increasing the canopy cover of trees in accordance with the 3-30-300 rule.	Urban Environment: Urban planning and land property Urban Construction and Facilities: Facility services, Infrastructure services
Areas affected by summer and winter energy poverty will be identified and adaptation measures will target these areas.	Business and economic development: Climate, nature and circular economy, Urban Construction and Facilities: Facility services
The city will communicate about the adverse effects of heat and drought and methods to prepare for and mitigate them.	Business and economic development: Climate, nature and circular economy Others: University of Turku, Regional Council of Southwest Finland
Occupational protection for employees exposed to heat will be enhanced by controlling harmful heat stress in accordance with the Finnish Institute of Occupational Health's recommendations.	Urban Construction and Facilities: Infrastructure services Others: Central administration: Corporate governance

STRENGTHENING RISK MANAGEMENT: Ecosystem changes and soil

The variety of tree species in the City of Turku will be developed so that Turku's urban tree population is ecologically and climatically sustainable and diverse in terms of both species and genetics. A diverse urban tree population with several species reduces the risk of diseases and pest, reduces risks caused by climate change and improves the city scenery, creates a pleasant environment and increases economic activity.	Urban Construction and Facilities: Infrastructure services
---	---

STRENGTHENING RISK MANAGEMENT: Ecosystem changes and soil

The conditions needed for pollinators to succeed will be sustained by preserving their preferred habitats. Fields and meadows that are natural habitats of the local species will be favoured over lawns in the urban environment. The number of trees and bushes offering nourishment will be increased in parks and in yards where possible.	Urban Construction and Facilities: Infrastructure services
Sufficient resources will be reserved for the prevention of harmful invasive alien species.	Urban Construction and Facilities: Infrastructure services, Urban Environment: Permits and monitoring
More attention will be paid to the risk of settlement in clay soils, and this risk will also be communicated to external stakeholders.	Urban Environment: Urban planning and land property Urban Construction and Facilities: Facility services, Infrastructure services

INVESTMENTS TO INCREASE RESILIENCE

The service reliability of critical infrastructure will be improved proactively and cost-efficiently in collaboration with other operators in the area. Preparedness for climate risks (including rainstorms, stormwater and sea floods, storms, periods of heat, changes in the ground bearing capacity, changes in the freezing-thawing cycle) will be ensured and service reliability improved during the planning, implementation, servicing and maintenance of construction, energy network, water supply, wastewater network, wastewater treatment plant, transport system and other infrastructure. Sufficient competence and resources will be ensured to support this.	Urban Environment: Urban planning and land property, Regional public transport, Urban Construction and Facilities: Infrastructure services Business and economic development: Climate, nature and circular economy Others: Turun Vesihuolto, Turun Seudun Vesi, Turku Energia, Lounais-Suomen Jätehuolto Oy
Energy self-sufficiency will be increased in the Turku region to prepare for climate risks and exceptional situations.	Business and economic development: Climate, nature and circular economy, Urban Environment: Urban planning and land property Others: Turku Energia, Turku University of Applied Sciences
The resilience of investments will be improved by taking into account the criteria for adaptation at both the city planning and project level and by combining the criteria for adaptation in the Taxonomy Regulation with Turku's city-level climate risk and vulnerability assessment.	Business and economic development: Climate, nature and circular economy
In conjunction with climate and sustainability budgeting, a framework will be developed for performing a cost-benefit analysis during assessment of critical infrastructure investments, with consideration of the impacts on business.	Business and economic development: Climate, nature and circular economy
A scenario analysis based on the latest climate scenarios for major projects will be implemented for planning and construction at vulnerable sites and in flood risk areas or other risk areas identified in the above-mentioned city-level assessment.	Urban Environment: Urban planning and land property, Urban Construction and Facilities: Infrastructure services, Facility services

INVESTMENTS TO INCREASE RESILIENCE

An operating model will be developed to systematically promote preparedness for climate risks in investments of less than EUR 1 million and in project types outside the taxonomy classification, such as park areas.	Urban Environment: Urban planning and land property Urban Construction and Facilities: Facility services, Infrastructure services Business and economic development: Climate, nature and circular economy
The city's investments from the perspective of climate change adaptation will be developed so that climate change adaptation is also taken into account in all relevant investments (e.g. new construction and renovation). Adaptation-related investments and procurements will be identified (e.g. some procurements related to security of supply and exceptional situations).	Central administration: Resource steering
Through its public procurement, the city aims to promote adaptation to climate change in the urban area, such as developing local and sustainable food production.	Central administration: Resource steering
Turku will provide information and encouragement regarding measures and investments targeting climate change adaptation for businesses, communities and residents. Information will simultaneously be collected from these parties to develop adaptation in the city.	Business and economic development: Climate, nature and circular economy
Critical actors will be encouraged to compile their own risk assessments and preparedness plans and to make the investments needed to cope with various climate risks, such as prolonged interruptions in electricity distribution in the main grid.	Business and economic development: Climate, nature and circular economy Central administration: Security and risk management

DEVELOPING DISASTER PREPAREDNESS

Businesses and communities operating in the city will be encouraged and supported to understand their role and responsibilities when preparing for climate risks and exceptional situations throughout the city. Examples of these situations include a prolonged period of heat or disruptions in water and electricity supply, which overload the capacity of authorities. The roles will also be identified and discussed together.	Business and economic development: Climate, nature and circular economy Others: Turun Vesihuolto, Turun Seudun Vesi, Turku Energia, Lounais-Suomen Jätehuolto Oy, Wellbeing Services County of Southwest Finland
Cooperation with insurance companies will be increased in order to specify the impacts of extreme weather events.	Business and economic development: Climate, nature and circular economy Others: University of Turku, Turku University of Applied Sciences
Climate risk management will be integrated into the plans and targets for preparedness, security and security of supply, and these will be reviewed together.	Business and economic development: Climate, nature and circular economy Central administration: Security and risk management

DEVELOPING DISASTER PREPAREDNESS

Residents' sense of community and awareness of climate risks as well as their ability to act in exceptional situations will be increased through communication and projects. The work done by associations, businesses and organisations will be recognised as part of the climate change adaptation entity. Adaptation and preparedness will be developed at the district level in cooperation with community associations and residents.	Business and economic development: Climate, nature and circular economy Children and young people Youth work Culture: Culture promotion
A process suitable for the city's operations will be developed to ensure that, after sudden climate risks and exceptional situations occur, the activities of the city organisation and other relevant actors will be evaluated and operating models developed based on experience when necessary.	Business and economic development: Climate, nature and circular economy Central administration: Security and risk management
The preparedness and ability in agriculture and forestry to cope with challenges caused by heat and drought will be developed in collaboration with partners, for example, by means of research, studies and communication.	Business and economic development: Climate, nature and circular economy Others: University of Turku

Monitoring adaptation

The implementation of climate change adaptation is based on long-term monitoring, assessment and cross-administrative cooperation. The implementation of Turku's climate change adaptation targets and measures is monitored systematically each year as part of the climate reporting to the City Council. In addition, annual reporting on adaptation work is submitted to the international CDP-ICLEI system that monitors the climate responsibility of the cities. The entity comprising the impacts of climate change, climate risks and adaptation will be evaluated and updated more thoroughly as part of the work to assess and update the Climate Plan during each council term. The monitoring is supported by a cross-administrative expert group consisting of representatives of different sectors and a working group on adaptation.

The participation of higher education institutions, research and development institutes and experts from the state and regional administration in the evaluation and monitoring work ensures the quality of adaptation work. Monitoring and its development will also be promoted in projects that support climate change adaptation and climate risk management.

Numerical indicators for urban adaptation work will be further developed at the EU and national level, as climate change adaptation is a broad and complex entity that is difficult to monitor at the local level. For example, a risk that is not realised does not necessarily indicate the success of adaptation in the case of rare weather events. Even the most serious consequences, such as the mortality caused by heat-

waves, cannot be monitored accurately at the city level, as extensive data is required to demonstrate links. At this stage, the following indicators have been identified as suitable for Turku's most significant risk categories and adaptation targets:

- Number of residents in coastal and inland flood risk areas
- Canopy cover (%)
- Percentage of energy-poor households (%)
- Percentage of investment projects that comply with the main climate change adaptation target or DNSH criteria of the EU taxonomy.

Monitoring related to ecosystem changes will also be carried out in the current Nature Positive Turku Roadmap. In terms of continuing the work, the implementation of indicator monitoring and the active utilisation of national development work have been identified as the next stages. More detailed analysis of vulnerabilities and the subsequent responses are a key element in climate risk management. Continuous planning, development and implementation of adaptation measures will also be emphasised in further work.

10. Towards a resource-wise city

Prior to updating the Climate Plan this spring, Turku has already received a new city strategy – Turku's Growth Story – which outlines the city's development towards 2040. In cooperation with stakeholders, partners and residents, our growth story reconciles the city's objectives related to sustainable growth, a just transition, climate change mitigation, climate change adaptation, and nature.

Our solutions are based on the best possible knowledge and, along with climate and nature objectives, support a stronger regional economy and society's crisis resilience. Together with our partners, we create nature and circular economy solutions for the world's needs and offer our young people work,

hope and opportunities to create a sustainable future together. We will put our sustainability targets into practice and make Turku a resource-wise city that is emission-free, waste-free and uses natural resources sustainably by 2040. We will achieve carbon neutrality in 2029 when we celebrate Turku's 800th anniversary, and our goal is to be nature-positive by 2030.

Sustainable goals are natural choice for us, because Turku is a city where generations have always built a foundation for future generations. We are part of this continuum. We are developing a good everyday life in our city for present and future generations. The story of Turku is a story of sustainability – one that we will build together.

Image 15. Strategic impact targets for the City Council term 2025–2029 and in the medium term 2025–2040.

Strategic impact targets for the City Council term 2025–2029 and in the medium term 2025–2040

- **Natural resource consumption and greenhouse gas emissions are decreasing in Turku** (indicator: biodiversity footprint)
- **Stronger climate change adaptation** (indicator: the EU's climate system classification)
- **Decrease in territorial and consumption-based greenhouse gas emissions** (indicator: the amount of greenhouse gas emissions)
- **Strengthening the circular economy in the Turku urban area** (indicator: the so-called Circular economy barometer index)
- **Strengthened Regional Biodiversity and Ecosystems** (indicator: the so-called Biodiversity index)

Annexes

1. Explanations of key concepts used in the Climate Plan	76
2. Climate Plan steering, participation and preparation group experts	81
3. Joint Statement of the Climate Partners of the City of Turku	85
4. Documents related to the Climate City Contract	86
5. Climate actions of Climate Team members	87
6. Climate risk cards.....	112
7. Source data for the Risk and Vulnerability Assessment.....	118
8. Description of emission calculation methods	119
9. Methodology for assessing the impacts of investments on the regional economy	123
10. Energy and transport poverty.....	127
11. Description of scenario calculations	132
12. Adaptation Scoreboard data	133

ANNEX 1. Explanations of key concepts used in the Climate Plan

3-30-300 rule

According to the rule, every resident should be able to see at least three trees from their home, neighbourhoods should have a canopy cover of at least 30%, and every resident should live within 300 metres of a high-quality green area of half a hectare in size.

ALAS calculation system

ALAS is a calculation system maintained by the Finnish Environment Institute that is used to calculate the greenhouse gas emissions of Finnish municipalities and regions. The model produces information on emissions from, for example, energy consumption, transport, agriculture and waste management and it supports climate work, emissions monitoring and climate target assessment in municipalities.

Atlantic Meridional Overturning Circulation AMOC

AMOC (Atlantic Meridional Overturning Circulation) is a system that allows warm surface water to flow northwards and cold sea water to flow back southwards closer to the bottom. The most significant warm ocean currents of AMOC are the Gulf Stream and the North Atlantic Current.

Biodiversity programme

A biodiversity programme is an action plan to protect biodiversity. The programme contains practical measures to halt biodiversity loss and increase biodiversity. Turku's biodiversity programme develops nature conservation as part of the urban structure and safeguards a favourable conservation status for species and habitats that are critical and typical to the Turku region while enhancing their biodiversity value.

Carbon balance

Carbon balance is the difference between absorbed and released carbon within a certain period of time, such as a year. A positive balance means that more carbon has been absorbed than released. For instance, a forest acts as a carbon sink when it removes carbon from the atmosphere. On the other hand, a forest is a source of carbon if it releases more carbon (as a result of tree felling, for example) than it absorbs.

Carbon credit

Carbon credit is a unit of trade used in a voluntary carbon market. A voluntary carbon market refers to trade based on carbon sequestration and emissions reduction that does not take place between states. One carbon credit represents a mitigation result that corresponds to one tonne of CO₂-eq. Domestic solutions for producing carbon credits include planting

trees, maintaining mires and wetlands, fertilising forests and producing biochar.

Carbon dioxide equivalent, CO₂-eq

Carbon dioxide equivalent is a joint measurement used to sum up the effect of different greenhouse gases in the atmosphere. For example, methane has a warming effect that is approximately 28 times stronger than carbon dioxide. Expressing methane emissions and other greenhouse gas emissions in carbon dioxide equivalents simplifies the expression of emission amounts.

Carbon footprint

Carbon footprint refers to the climate burden of a specific limited entity. A carbon footprint can be calculated e.g., for a product or service based on the quantity of greenhouse gas emissions caused by producing, consuming and disposing of it. A carbon footprint can also be calculated for a business, municipal residents or an investment.

Carbon footprint threshold value for buildings

Carbon footprint threshold value for buildings refers to a specific maximum amount of greenhouse gas emissions that a building may not exceed during its life cycle. The threshold value includes the building's load-bearing frame, complementary elements, main building services and underground heated spaces and their structures. It is usually expressed in carbon dioxide equivalents (CO₂-eq).

Carbon handprint, also climate handprint

Carbon handprint refers to the positive climate impacts of a specific solution during its life cycle. A positive carbon handprint results from a situation where using a certain solution reduces the carbon footprint of someone else (a client, for instance).

Carbon neutral

A carbon-neutral municipality, business, product or service does not burden the climate. In practice, this means that the local emissions and carbon sinks as well as potential offsetting measures balance each other out. For businesses and communities as well as products and services, carbon neutrality means reducing the carbon footprint as much as possible and offsetting emissions that can't be reduced.

Carbon offset, Climate compensation

The starting point for carbon offset is an implemented project that has reduced greenhouse gas emissions or increased carbon sinks by the quan-

tity of carbon credits on sale. One carbon credit is equivalent to either a reduction in greenhouse gas emissions or an increase in carbon sinks worth one tonne of carbon dioxide equivalents (1 t CO₂-eq). For instance, a municipality, business, organisation or consumer can offset the greenhouse gas emissions caused by their action by buying carbon credits. The rules for this are still under development at the EU and national level.

Carbon sink

A carbon sink refers to a growing carbon storage that collects and stores a chemical compound from the atmosphere that contains some carbon, usually carbon dioxide. Plants act as a carbon sink when they absorb carbon dioxide during their growth. In addition to vegetation, the surface layers of the seas are carbon sinks because they absorb carbon dioxide. A forest is a carbon sink if, during growth, it absorbs more carbon dioxide to form a carbon storage in the trees and soil than, for example, what is released in felling (see Carbon storage).

Carbon storage

Carbon storage is a place that stores carbon. For example, a tree or other biomass can absorb carbon, in which case the carbon is no longer in the atmosphere. Forest land, trees and mires are natural carbon storages. A plant that does not grow can act as a carbon storage. Wooden buildings and other long-lasting wood products are also carbon storages.

CDP, Disclosure Insight Action (ent. Carbon Disclosure Project)

CDP is a non-profit organisation dedicated to encouraging businesses, cities and governments to reduce their greenhouse gas emissions, secure the water supply and protect forests. It maintains a global environmental information system for businesses, cities, states and regions by collecting climate change-related data. Turku has been ranked in the highest A class in 2025, 2024, 2023, 2022, 2021, 2020 and 2019.

CitiesWithNature initiative

An international network and platform that supports cities in protecting biodiversity and promoting nature-positive solutions. The network is part of ICLEI (see ICLEI - Local Governments for Sustainability).

Circular economy

A circular economy is an economic system that seeks to minimise waste and wasted resources. A circular economy keeps materials and products in circulation for as long as possible rather than manufacturing, using and discarding them (linear model). The goal is to save natural resources, reduce emissions and promote sustainable economic growth.

Climate and sustainability budget

The climate and sustainability budget links climate work to the city's budget and financial statements. It helps with compiling, managing and monitoring climate investments and actions, and makes them more visible. The climate and sustainability budget provides information for decision-making and increases transparency for municipal residents.

Climate change adaptation

Climate change adaptation refers to adapting to the expected effects of climate change and to changes that have already taken place. Through adaptation, we seek to prevent or mitigate the negative impacts of climate variation and change as well as to benefit from the positive impacts. Adaptation can mean reacting to situations or anticipating them. Along with humans, nature's systems also strive to adapt to climate change, but the speed of climate change makes adaptation difficult or impossible for many species and ecosystems.

Climate city contract, climate city contract partnership

As part of the EU Mission for Climate-Neutral and Smart Cities, a climate city contract has been created to strengthen partnerships. Approximately 50 key businesses and communities in Turku as well as the higher education institutions in the region have committed to the climate city contract. The members of the network are called climate partners. In addition to the commitments made by the city and its partners, the Climate City Contract includes action and investment plans focusing on the City Group's measures.

Climate disinformation

Climate disinformation is the intentional spread of false or misleading information about climate change and climate action. Climate disinformation takes the form of denial, conspiracy theories and arguments that seek to obscure the facts. For example, it may seek to try to cast doubt on the scientific consensus or sway people's opinions with the aim of obstructing climate actions.

Climate hazard

In terms of climate risk, a climate hazard is a phenomenon or condition related to climate change that can cause harm to people, the environment or society. Climate hazards include heat waves, rainstorms, floods, drought or storms. They become a risk when they encounter exposed objects and vulnerability.

Climate positive

Climate positivity refers to the socially positive net impact that a product, business, municipality or state has on climate change mitigation. Climate positivity helps to prevent or slow climate change. For exam-

ple, a city that is climate positive can be considered to change the net impact in its area from one warming the climate to one cooling the climate.

Climate resilience

The ability of society, infrastructure and nature to prepare for and cope with the effects of climate change, and adapt to changing circumstances. For example, this means that cities, communities, businesses and people can also function during heat waves, rainstorms, floods and other climate risks and recover from them quickly.

Consumption-based emission calculation

Consumption-based emission calculation is based on the consumption of energy, goods and services by households in the area, investments and public administration consumption. In this case, the physical location of the emissions is irrelevant and the calculation takes the entire production chain of products and services into account. In consumption-based emission calculation, all emissions – both in Finland and abroad – generated in the production chains of products and services consumed in the area during the review period are calculated as emissions. (Compare with territorial emission calculation.)

Covenant of Mayors

The EU Covenant of Mayors is the world's largest movement of cities and towns working to implement local climate and energy targets. Established by the European Commission in 2008, the initiative encourages and supports cities and towns to voluntarily exceed the EU's climate and energy targets. Topics covered by the Covenant of Mayors include mitigating and adapting to climate change and tackling energy poverty.

Ecological compensation

Ecological compensation refers to measures that compensate for the harm caused to nature when the harm cannot be completely prevented or mitigated. For example, biodiversity loss can be compensated by restoring or protecting nature elsewhere so that biodiversity as a whole is preserved or strengthened.

Emission factor

An emission factor describes the amount of emissions generated with the quantity of product or service produced. Depending on their scope, emission factors can be of many types. They may describe the use phase or life-cycle emissions, include only carbon dioxide emissions or all greenhouse gas emissions.

Energy positivity

Energy positivity refers to a situation in which energy production exceeds excess local needs and can be distributed to other regions.

Energy poverty

A situation in which a household has difficulties obtaining sufficient energy, e.g. for heating, electricity or other basic needs, at a reasonable cost.

EU Mission for 100 Climate-Neutral and Smart Cities by 2030

The EU Mission for 100 Climate-Neutral and Smart Cities by 2030 supports European cities in their efforts to become carbon-neutral by 2030. The mission aims to accelerate climate work in cities, develop new solutions for sustainable urban development and set an example for other cities in Europe. The participating cities work closely with residents, businesses, research institutes and other actors to promote the sustainability transition.

EU taxonomy

The EU taxonomy is the European Union's classification system for sustainable financing. It defines the classification and criteria for identifying financial and investment targets that can be considered sustainable. The taxonomy was created to support the EU's climate and environmental targets and is part of implementation of the European Green Deal. In order for an economic activity to be classified as sustainable in the taxonomy, it must contribute to at least one of the six defined taxonomy objectives without harming any other objective. The six objectives are: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems.

European Commission Joint Research Centre

The European Commission's internal science and knowledge service, providing independent and impartial research to support EU policymaking.

European Green City Accord

A European Commission initiative in which cities commit to taking ambitious actions for the good of the environment and urban nature by 2030. The accord focuses particularly on air quality, water quality, biodiversity, the circular economy, waste and reducing noise pollution.

European Investment Bank

The European Investment Bank is the European Union's financial institution, which was founded in 1958 by the Treaty of Rome. The investment bank's task is to develop the economic, social and regional cooperation of the Community, i.e. cohesion, in a balanced manner. All EU Member States are members and shareholders in the EIB. The financing activities focus on European transport and communication

networks, the energy sector, small and medium-sized enterprises, employment, the environment, education and health care.

Exposure

The location of the object of climate risk. People, ecosystems or buildings and infrastructure are located in areas that are exposed to adverse weather events or long-term changes (such as rising sea levels, heat waves or floods) caused by climate change. In addition to vulnerability and climate hazards, this is one of the key elements in terms of assessing overall climate risk.

FISU municipality

FISU (Finnish Sustainable Communities) is a network of pioneering municipalities committed to achieving carbon neutrality, zero waste and globally sustainable consumption by 2050. As part of the network, the municipality, businesses in the region and other local actors build a common vision and roadmap for achieving the sustainability goals. The network is coordinated by the Finnish Environment Institute SYKE and Motiva, which together form a service centre that supports the Fisu municipalities. In 2026, the network included Forssa, Hyvinkää, Hämeenlinna, Ii, Joensuu, Jyväskylä, Kemi, Kuopio, Lahti, Lappeenranta, Riihimäki, Siilinjärvi, Turku and Vaasa.

Green Deal and EU Green Deal

In Finland, a Green Deal is a voluntary agreement between the state and business or the public sector that aims to find solutions to climate challenges, loss of biodiversity, overconsumption of natural resources and promoting a circular economy. The EU Green Deal is the European Union's green development programme – a set of policy initiatives aimed at steering Europe towards a green transition. The goal is to make Europe the first climate-neutral continent by 2050.

Green finance

Financing that supports projects and investments that are sustainable from the perspective of climate and the environment. The objective of green financing is to accelerate the transition towards a low-carbon and sustainable society by directing financial flows towards climate and environmentally friendly targets. These include renewable energy, energy efficiency, low-emission mobility, biodiversity protection and circular economy solutions. For example: MuniFin grants a margin discount for green financing projects, according to which the greener the project, the more affordable the financing.

Green transition

Green transition refers to a structural change in the economy and industry towards sustainable growth

and a carbon-neutral society. This is a shift towards ecologically sustainable growth that is not based on overconsumption of natural resources and fossil fuels. In a green transition, the economy is based on low-carbon solutions and solutions that promote the circular economy and biodiversity.

Greenhouse gas

Greenhouse gases refers to the gases that cause the greenhouse effect. The most significant long-lived greenhouse gases that affect global warming are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). The concentrations of these gases in the atmosphere have increased significantly since the pre-industrial era. Many synthetic chemicals produced by humans, such as chlorofluorocarbons, fluorinated compounds and bromine compounds, are also powerful greenhouse gases.

Greenhouse gas emissions per capita

Emissions per capita are calculated by dividing territorial emissions by the number of residents in the year in question.

ICLEI - Local Governments for Sustainability

ICLEI is an international organisation that promotes sustainable development in local governments. The global ICLEI network includes approximately 2,500 local and regional governments as well as 14 cities in Finland. Turku has been an ICLEI member since 1995. Mayor Piia Elo has been Vice President of ICLEI since 2026.

Maladaptation

Maladaptation refers to adaptation measures that, contrary to their purpose, actually increase vulnerability or exposure to climate change.

Nature-based solution

Nature-based solutions (NBS) are solutions to societal problems that are based on or inspired by nature. They simultaneously provide ecological, social and economic benefits.

Nature positivity

An approach that aims to increase biodiversity and improve the state of ecosystems. The activities not only minimise harm but also improve the state of nature. Nature positivity is more than nature neutrality, which only aims to minimise biodiversity loss.

Paris Agreement

A legally binding, international treaty to combat climate change. Its goal is to keep the rise in global average temperature well below 2°C above pre-industrial levels, while pursuing efforts to limit the increase to 1.5°C above pre-industrial levels.

Resource wisdom

Resource wisdom is the ability to use resources in a carefully considered manner that promotes regional well-being, vitality and other sustainable development goals. Resource wisdom can be promoted by means of circular economy, material life-cycle management, energy and materials efficiency and the adoption of renewable energies. The impacts of resource use are examined extensively at three levels of society, aiming for emission-free, waste-free and ecologically sustainable consumption.

SECAP, Sustainable Energy and Climate Action Plan

SECAP (Sustainable Energy and Climate Action Plan) is a common European Union model for climate work in cities and regions. A SECAP must be prepared within two years of joining the Covenant of Mayors (see Covenant of Mayors). The plan assesses geographical, demographic and energy-related factors, sets emission reduction targets, identifies targets for emission reduction and defines actions. The plan also includes an assessment of regional risks and vulnerabilities related to climate change, adaptation measures, and an analysis of energy poverty and its reduction.

Sendai Framework

The Sendai Framework for Disaster Risk Reduction 2015–2030 is an international document adopted by the Member States of the United Nations at the World Conference on Disaster Risk Reduction held from 14 to 18 March 2015 in Sendai, Japan. The document identifies seven targets and four priorities in order to prevent new disaster risks and reduce existing risks while simultaneously decreasing hazards to human life, livelihoods and health.

Sustainability transition

Sustainability transition is a broad societal change that involves moving to more ecologically, socially and economically sustainable operating methods. It requires changes in areas such as energy production, mobility, the food system, consumption and the economy in order to mitigate climate change and biodiversity loss and to safeguard well-being also in the future.

Territorial emission calculation

Territorial emission calculation examines the climate emissions generated by a municipality's public administration, residents and people visiting the municipality, as well as the activities of businesses in the region. The calculation includes emissions occurring within the municipality's geographical area and those that occur outside the area but are caused by the municipality's public administration, residents and businesses in the region. ALAS calculation includes emissions from electricity and district heating

consumption, waste management and passenger car traffic occurring within and outside the municipality. Territorial emission calculation is based on use and production. (Compare with consumption-based emission calculation.)

The Agreement on Land Use, Housing and Transport

Agreements on Land Use, Housing and Transport are agreements concluded between the state and the largest urban regions in order to, among other things, promote climate wisdom. The agreements strengthen cooperation between the municipalities in the urban regions and between the region and the state. The agreements specify the objectives and concrete measures for housing production in the coming years and for the development of a sustainable community structure and transport system.

Transport poverty

A phenomenon or situation in which the costs of mobility related to everyday life and essential work and livelihood, studies and social relationships, health care and/or other essential services are high in relation to the available income. The phenomenon may be influenced by factors such as high mobility costs, inadequate public transport or long distances.

Urban heat island effect

Urban heat island refers a phenomenon in which the temperature in a city centre is higher than in the surrounding areas. An urban heat island develops because built surfaces such as asphalt, concrete and buildings store heat, there is less vegetation to cool the air, and traffic, energy consumption and other human activities also produce heat. It can be mitigated by, for example, increasing the number of trees and green areas.

Vulnerability

Vulnerability describes the extent to which people and ecosystems are exposed to the harmful effects of climate change and how well they can adapt to or cope with them. Factors affecting vulnerability include financial circumstances, level of education, the age structure of the population, and the functional capacity of institutions and organisations. These factors affect the ability to anticipate risks, prepare for them in advance and recover if they are realised. This is crucial from the point of view of how wide-reaching the consequences are.

Weather and climate risks

Weather and climate risks refer to potential direct and indirect harm to human activities, businesses and the environment caused by climate, weather and their development. Factors affecting the emergence of a risk include the climate hazard, exposure and vulnerability.

ANNEX 2.

Climate Plan steering, participation and preparation group experts

Ilmastosuunnitelman arviointi ja päivitystyöstä vastasi Turun kaupungin Ilmasto, luonto ja kiertotalous The City of Turku's Climate, Nature and Circular Economy unit was responsible for assessing and updating the climate plan, with Risto Veivo, Lotte Suveri and Miika Meretoja overseeing the work. Niina Ruuska, Iris Kriikkula, Maria Granlund, Anna von Zweybergk, Hilja Kurkinen, Helmi Loukonen, Misa Tuomaala, Petra Svahn, Olga Laakso, Noora Nest and Akseli Vuorenmaa participated in preparing the themes and areas.

The following experts provided support for the work: Santtu Karhinen, Senior Researcher, Jari Rantsi, Senior Coordinator and Jyri Seppälä, Research Professor, Finnish Environment Institute and Suvi Monni, Senior Sustainability Advisor, Second Horizon Advisory.

A large number of experts as well as representatives from the City of Turku, stakeholders and cooperation networks were invited to take part in the assessment and updating process. In addition to the working group meetings, the responsible leaders and experts for different themes met separately. The experiences of reference cities were also utilised in the work.

The participation methods related to the process, such as decision-making, management group meetings to present and discuss the climate plan content, working group meetings and participants, and stakeholder events are listed below.

Decision-making

- 7 April 2025 City Board: Decision on updating the climate plan
- 15 June 2026 Plan submitted to City Council for a decision

Management group consultations and other meetings

Collaborative Leadership Group for Environment	• 8 October 2025 • 1 December 2025 • 27 April 2026
Service Division of Urban Environment, management group	• 29 October 2025 • 29 April 2026
Service Division of Sports, management group	• 10 November 2025
Service Division of Culture, management group	• 4 February 2026
Service Division of Children and Young People's Services, management group	• 23 March 2026
Service Division of Urban Construction and Facilities, management group	• 4 March 2026 • 15 April 2026 • 22 April 2026
Service Division of Business and Economic Development, management group was informed throughout the process	
Urban Environment zoning department	• 9 April 2026
Turku Group companies and organisations, strategic seminar	• 21 May 2026

Working groups:

There were seven climate plan working groups, and a large number of experts representing the City of Turku and stakeholders have been invited to participate in them. The working groups discussed content for the climate plan in accordance with the themes. Themes of the working groups:

- Strategy, vision and implementation
- Mobility
- Communication and participation
- Energy
- Urban structure, construction and investments
- Nature city and carbon sinks
- Adaptation

Working group meetings:

3 November 2025 13:00–15:00	Joint kick-off for all working groups
23 April 2026 8:30–11:00	Joint final meeting for all working groups

First meetings of the working groups:

11 November 2025 13:00–14:00	Adaptation
3 December 2025 13:00–15:00	Nature city and carbon sinks
5 December 2025 12:30–14:30	Urban structure and construction
9 December 2025 13:30–14:00	Communication and participation
9 December 2025 14:30–16:00	Mobility
10 December 2025 8:30–10:00	Energy
11 December 2025 10:00–12:00	Strategy, vision and implementation

Second meetings of the working groups:

26 February 2026 9:00–11:00	Nature city and carbon sinks
9 March 2026 13:00–15:00	Adaptation
10 March 2026 9:00–11:00	Urban structure and construction
12 March 2026 9:00–11:00	Strategy, vision and implementation
16 March 2026 13:00–15:00	Mobility
19 March 2026 12:00–14:00	Energy working group
17 March 2026 13:00–15:00	Communication and participation

In addition, an extraordinary expert consultation on adaptation to climate change was held in the City of Turku on 16 April 2026 from 12:00 to 14:00.

Participants in the working groups:

Approximately 200 experts were invited to the working group meetings, and a total of 121 persons participated actively in the work.

Participants from the City of Turku:

Aaltonen Stella, City of Turku
Aarnio Amalia, City of Turku
Aantaa Lauri, City of Turku
Andell Kia, City of Turku
Andersson Helmi, City of Turku
Antola Anne, City of Turku
Elo Juha, City of Turku
Forsman Pauliina, City of Turku
Granlund Maria, City of Turku
Grönholm Björn, City of Turku

Helenius Natalie, City of Turku
Jalonen Timo, City of Turku
Katajainen Anton, City of Turku
Kauppila Ilona, City of Turku
Paula Keskikastari, City of Turku
Kivimäki Minna, City of Turku
Korpikoski Johanna, City of Turku
Kriikkula Iris, City of Turku
Korte Sirpa, City of Turku
Laakso Olga, City of Turku
Lahtinen Risto, City of Turku

Lappi Jyrki, City of Turku
 Leinonen Elmeri, City of Turku
 Linden Anri, City of Turku
 Loukonen Helmi, City of Turku
 Luoto Leevi, City of Turku
 Malila Saara, City of Turku
 Mamia Virpi, City of Turku
 Marsel-Martikainen Iisa, City of Turku
 Meretoja Miika, City of Turku
 Metsäranta Nea, City of Turku
 Mäkinen Jaana, City of Turku
 Mäkelä Antti, City of Turku
 Mäkelä Krista, City of Turku
 Mäki Olli-Pekka, City of Turku
 Nest Noora, City of Turku
 Orvasto Oskari, City of Turku
 Paakki Katri, City of Turku
 Pajumäki Pirkka, City of Turku
 Panschin Andrei, City of Turku
 Pendolin Irene, City of Turku
 Peltonen Risto, City of Turku
 Päivike Siiri, City of Turku
 Raunio Selina, City of Turku
 Rusanen Maija, City of Turku
 Ruuska Niina, City of Turku
 Räisänen Anna, City of Turku
 Salmela Noora, City of Turku
 Savola Anne, City of Turku
 Ståhlberg Jaakko, City of Turku
 Suonpää Kimmo, City of Turku
 Suveri Lotte, City of Turku
 Svahn Petra, City of Turku
 Södergrann Henrik, City of Turku
 Tuomi Kalervo, City of Turku
 Tuomala Misa, City of Turku
 Veivo Risto, City of Turku
 Viander Tero, City of Turku
 Virtanen Juuso, City of Turku
 Zinchuk Olena, City of Turku
 von Zweybergk Anna, City of Turku

Participants from other organisations:

Aaltonen Valtteri, University of Helsinki
 Ahonen Krista, Turku Chamber of Commerce
 Aren Carol, Visit Turku Archipelago
 Artimo Aki, Turun seudun vesi Oy
 Faehnle Maija, Finnish Environment Institute SYKE
 Haapanen Olli, Valonia
 Helmi Satu, Turku University of Applied Sciences
 Honkanen Timo, Turku Energia
 Hukkalainen Mari, VTT
 Hurme Pia, Wellbeing Services County of Southwest Finland

Huttunen Anna, Net Zero Cities
 Käyhkö Jukka, University of Turku
 Karhinen Santtu, Finnish Environment Institute SYKE
 Kiviluoto Katariina, Turku University of Applied Sciences
 Koivula Tuomas, University of Turku
 Konst Taru, Turku University of Applied Sciences
 Koponen Aki, Turku School of Economics
 Körber Jan-Hendrik, Turku University of Applied Sciences
 Laanti Jarkko, Turun Seudun Puhdistamo Oy
 Lahtela Anni, Valonia
 Leka Jarkko, Valonia
 Leino Petri, OP
 Lempiäinen Petri, Turku Science Park
 Leskinen Piia, Turku University of Applied Sciences
 Leskinen Riikka, Valonia
 Lintunen Anna, University of Helsinki
 Lyytikäinen Lotta, Turku Energia
 Lähdemäki Lasse, TVT Asunnot
 Malmi Johannes, TVT Asunnot
 Malmberg Jarkko, Kaarea
 Meriluoto Antton, VASO
 Monni Suvi, Second Horizon Advisory
 Myllykoski Nina, Economic Development Centre
 Myllymäki Eetu, Turku and Kaarina Parish Union
 Niemelä Minna, Turku Energia
 Norontaus Liisa, VASO
 Parkkila Pekka, Economic Development Centre
 Parkkonen Juha, Turku City Public Transport Ltd
 Perkonoja Juho, Turku Energia
 Piekkari Pauli, TVT Asunnot
 Posio Pilvi, University of Turku
 Ranta Samuli, Turku University of Applied Sciences
 Rantsi Jari, Finnish Environment Institute SYKE
 Saaristo Seppo, Turun monitoimitilat
 Salminen Pekka, Economic Development Centre
 Salo Paula, University of Turku
 Saraperä Sami, Turun Vesihuolto
 Seppälä Jyri, Finnish Environment Institute SYKE
 Setälä Leena, Wellbeing Services County of South-west Finland
 Siilos Risto, Turku Student Village Foundation
 Suomi Juuso, University of Turku
 Sundberg Pertti, Naantali power plant
 Taatila Vesa, Turku University of Applied Sciences
 Tapio Petri, University of Turku
 Timonen Risto
 Tommola Maria, Valonia
 Tontti Minna, Turku Tramway
 Triipponen Juha-Pekka, Economic Development Centre
 Vuorisalo Timo, University of Turku
 Ylänen Henna, Turku City Museum

Other participation

Climate partners

Nearly 50 key partners in the region have already joined the City of Turku's climate city contract. These businesses, higher education institutions and communities support the carbon neutrality target with their own

impactful climate actions. They also communicate about their climate actions and participate in the activities of Turku's Climate Team.

The climate partners met four times at partner forums held during the process of updating the climate plan. The key themes of these forums were accelerating climate, nature and circular economy work in businesses and sharing information on the region's climate solutions.

Date:	Meeting theme:
27 August 2025	• Vision work for carbon-neutral Turku
5 November 2025	• Turku's emissions gap, agency in systemic change
11 February 2026	• Peer learning from climate work done by partners, climate risks in Turku
8 April 2026	• Mayor's Climate Meeting

Climate partners:

Auran Aallot / Bauer Media	Turun kaupunkiliikenne Oy
Bayer Oy	Turku Music Festival Foundation
Blue Industry Park Oy	Turun Monitoimitilat Koy
Business Turku Oy	Turun Osuuskauppa
Forum Marinum Foundation	Turku Tramway
HC TPS Turku Oy	Port of Turku Ltd
Kaarea Oy	Turun Seudun Puhdistamo Oy
Kuntec Oy	Turun Seudun Vesi Oy
Logomo Oy	Turun TeknologiaKiinteistöt Oy
Lounais-Suomen Jätehuolto Oy	Art House Turku
Meriaura Oy	Turku Student Village Foundation (TYS)
Meyer Turku	Turku University Foundation
Novia	University of Turku
OP Varsinais-Suomi	Turun Vesihuolto Oy
Orion Pharma	TVT Asunnot Oy
PN Turku Oy / Paavo Nurmi Games	Varsinais-Suomen Asumisoikeus Oy
Stiftelsen för Åbo Akademi	Wellbeing Services County of Southwest Finland
Turun Aikuiskoulutussäätiö [Turku Adult Education Foundation]	Regional Council of Southwest Finland
Turku University of Applied Sciences	Visit Turku Archipelago Oy
Turku Energia	Viking Line Abp
Turku and Kaarina Parish Union	Veritas
Turku Chamber of Commerce	Åbo Akademi University
Turku City Theatre	Åbo Svenska Teater
	Åbo Underrättelser

Public events:

Two public events held in connection with the update of the climate plan focused on discussing the city's climate goals and sustainable life.

6 November 2025 16:00–17:00 Turku City Library	Closing event for Youth Climate Projects, Young people's visions of a carbon-neutral Turku.
14 April 2026 16:00–19:00 Kåren	Discussions on a sustainable life in Turku with organisations, residents, city employees and city councillors.

ANNEX 3.

Joint Statement of the Climate Partners of the City of Turku

Published at the Mayor's Climate Meeting on 8 April 2026

We, the Climate Partners of the City of Turku, are committed to supporting Turku in achieving its goal of becoming climate neutral by 2029, the year in which the city celebrates its 800th anniversary.

We aim to serve as examples of forward-looking climate and nature action. This includes supporting the transition of the entire Turku region towards a low-carbon society, where sustainable solutions strengthen the competitiveness of both the region and its businesses.

The sustainability transition requires the participation of society as a whole. Companies and organizations play a key role in creating climate-smart and nature-positive solutions and markets. In addition, consistent policies, reliable information, and residents who make sustainable choices are essential.

The role of cities is also crucial. Their ambitious targets and their ability to bring stakeholders together enable them to accelerate the transition more rapidly than nation states. Right now, cities, businesses, and communities are jointly driving the change that the ecological crisis demands of us. New development can only be built with sustainability at its core.

We are proud that Turku is one of the world's leading climate cities. This achievement is the result of long-term and systematic collaboration.

Turku's position as a maritime climate and nature city benefits everyone. It enhances the attractiveness of the region and helps build a sustainable future for both today's residents of Turku and future generations. Let us work together to ensure that Turku remains a great place to live for the next 800 years as well.

Climate partners of City of Turku:

Auran Aallot / Bauer Media
Bayer Oy
Blue Industry Park Oy
Business Turku Oy
Forum Marinum Säätiö
HC TPS Turku Oy
Kaarea Oy
Kuntec Oy
Logomo Oy
Lounais-Suomen Jätehuolto Oy
Meriaura Oy
Meyer Turku
Novia
OP Varsinais-Suomi
Orion Pharma
PN Turku Oy / Paavo Nurmi Games
Stiftelsen för Åbo Akademi
Turun aikuiskoulutussäätiö
Turun ammattikorkeakoulu
Turku Energia
Turun ja Kaarinan seurakuntayhtymä
Turun Kauppakamari
Turun Kaupunginteatteri Oy
Turun kaupunkiliikenne Oy
Turun Musiikkijuhlasäätiö
Turun Monitoimitilat Koy
Turun Osuuskauppa
Turun Raitiotie Oy
Turun Satama Oy
Turun Seudun Puhdistamo Oy
Turun Seudun Vesi Oy
Turun Teknologiaakiinteistöt Oy
Turun Taiteen talo Oy
Turun Ylioppilaskyläsäätiö TYS
Turun Yliopistosäätiö
Turun Yliopisto
Turun Vesihuolto Oy
TVT Asunnot Oy
Varsinais-Suomen Asumisoikeus Oy
Varsinais-Suomen hyvinvointialue
Varsinais-Suomen liitto
Visit Turku Archipelago Oy
Viking Line Abp
Veritas
Åbo Akademi
Åbo Svenska Teater
Åbo Underrättelser

ANNEX 4.

Documents related to the Climate City Contract

EU Mission for 100 Climate-Neutral Cities

In 2022, Turku was selected, with highly positive evaluations, to join the European Union's Mission for 100 Climate-Neutral Cities, which supports cities in achieving climate neutrality by 2030 at the latest. In this context, the European Commission awarded Turku the **Mission Label** as a recognition of its pioneering efforts.

The 100 cities act as testing platforms and examples for others. They share best practices and encourage one another in reaching their goals. Turku has already received recognition from the European Commission for the implementation of its Climate City Contract.

Mission cities prepare their own **Climate City Contract**, which is assessed and approved by the European Commission. Turku's contract was approved in March 2024. The contract outlines the key measures through which climate neutrality will be achieved and explains how these measures will be financed. In addition, organizations committed to the shared objective are invited to join the contract. Through their own actions, these organizations can support the city's journey towards climate neutrality.

Nearly 50 key regional partners have already joined Turku's Climate City Contract. These companies, higher education institutions, and organizations support the climate neutrality target through their own impactful climate actions. They also communicate about their climate initiatives and participate in the activities of Turku's Climate Team. The partners' commitments are presented in **Document 1: 2030 Climate Neutrality Commitments of the City of Turku**.

The Climate City Contract consists of four parts.

1. [2030 Climate Neutrality Commitments of City of Turku](#)
2. [2030 Climate Neutrality Action Plan](#)
3. [2030 Climate Neutrality Investment Plan](#)
4. [National commitment to Climate City Contracts for EU Mission on Climate-neutral and Smart Cities](#)

ANNEX 5. Climate actions of Climate Team members

Card number and name	Main executing body	Other executing bodies	Target of the measure
1. Carbon-neutral heat	Turku Energia	Turku Energia with its affiliated companies and partners	Turku Energia sets a target that 80% of the heat sold in 2025 is renewable energy.
2. Smart two-way district heating network	Turku Energia	City of Turku, Tekes – the Finnish Funding Agency for Technology and Innovation, VTT Technical Research Centre of Finland Ltd, Sitra, Energiategollisuus ry, Skanssi shopping centre, YH kodit, Hartela	District heating is being developed in a low-emission direction. The heating network is opened up to new producers and innovations.
3. Increasing the bio share of Naantali multifuel power plant	Turku Energia	Turun Seudun Energiantuotanto Oy, Fortum	Increasing the bio share of the Naantali multifuel power plant owned by Turku Energia's affiliated company Turun Seudun Energiantuotanto Oy
4. Increasing solutions for energy storage (district heating & cooling)	Turku Energia		Enabling an increase in low-emission and renewable production of district heating by developing heat and cold storage to balance production and consumption peaks
5. Reducing network losses of the district heating network	Turku Energia		Improving energy efficiency by reducing heat loss in the district heating network
6. Citizens' energy (project / projects)	Turku Energia	City of Turku, Sitra, Turku Energia, Turku City Group subsidiaries responsible for premises and housing, University of Turku	The aim of the Citizens' energy project is significantly improve and accelerate opportunities for energy investments by citizens, companies and communities.
7. Carbon-neutral electricity	Turku Energia	Turku Energia with its affiliated companies and partners	Turku Energia sets a target that 80% of the electricity sold in 2025 is renewable energy. In this case, almost all the electricity sold will be carbon neutral.
8. Building solar systems on the Turku City Group's properties	Turku Energia	City of Turku, Turku City Group subsidiaries	Improving energy efficiency in Turku City Group's properties
9. Performing energy efficiency assessments in the city's properties	City of Turku	Turku Energia, partners and experts	The aim is to improve energy efficiency.
10. Demand response in city properties	Turku Energia	Turku Energia, City of Turku and Turku City Group subsidiaries	The aim is to improve energy efficiency.

Card number and name	Main executing body	Other executing bodies	Target of the measure
11. Replacing fossil fuels in public transport with biofuels	Föli	Traffic contractors and suppliers	The goal is carbon-neutral public transport by 2029.
12. A tramway from the Port to Varissuo	Turun raitiotie Oy and the City of Turku	Other participating municipalities, the Government, Föli, builders and suppliers	The goal is carbon-neutral public transport by 2029.
13. Electric bus transport	Föli	Participants' associations, Turun kaupunkiliikenne Oy, traffic contractors and technology developers	Electrification of public transport lines as efficiently as possible (Carbon-neutral public transport by 2029).
14. Public transport trunk lines	Föli	City of Turku and other participants' associations, Turun kaupunkiliikenne Oy, traffic contractors and suppliers	Implementation of a public transport trunk line network.
15. Public transport passenger information and disruption management	Föli	City of Turku and other participants' associations, Turun kaupunkiliikenne Oy, traffic contractors and suppliers	Increasing the use of public transport by improving service.
16. Improving the charging point network for electric cars	City of Turku	Turku Energia, charging point operators, property owners and users	Significant improvement in the conditions for electric cars in private and business use by developing a fast charging network in public spaces and promoting charging possibilities at residential and commercial properties.
17. Piloting and development of a two way charging point (V2G)	Turku Energia	City of Turku and charging operators	The goal is to promote electric transport and integrate mobility and the energy system.
18. Implementing charging points within city properties	Turku Energia	City of Turku, other municipalities in the Turku region	Promoting electric transport in the Turku region.
19. Promoting transport use of biogas	City of Turku	Turku University of Applied Sciences, the Growth Corridor project partners and other collaboration partners	Improve the possibilities for refuelling with biogas, create the conditions for biogas production and increase the number of gas-powered vehicles.
20. Quality cycling corridors and main network	City of Turku	TKS Kunnat	Improve cycling conditions and promote cycling during all seasons.
21. City bike system	City of Turku	Föli, ECCENTRIC project (until 8/2020 max.), implementers and the supplier	Provide access to a good city bike system as a year-round service.

Card number and name	Main executing body	Other executing bodies	Target of the measure
22. Utilising large-volume masses in the city	CIRCVOL 6-aika project	CIRCVOL 6-aika project, TScP, Kiertomaa, 12 executors in total	Reduce the use and waste of virgin materials and transport emissions.
23. Carbon sinks in forests	City of Turku	Other forest owners, residents	Increase carbon storages and sinks and trees in forests to offset emissions.
24. City carbon sinks	City of Turku	Maintainers, land-owners, construction developers	Increase carbon storages and sinks and trees in the soil and vegetation to offset emissions.
25. Fully electric and carbon-neutral transport equipment for transporting wheelchairs and goods	Futureko Oy	Autokori ja -verhoilu J. Lehtinen Oy	Help the city achieve its carbon neutrality goals by enabling low-emission wheelchair and goods transport and expanding the charging infrastructure.
26. Solar panels at TSYK Upper Secondary School	The City of Turku Education Division - TSYK Upper Secondary School	TSYK:n Kannatusyhdistys, Turku Energia, Turku University of Applied Sciences, Solar LAB	The aim is to promote the use of renewable forms of energy in the school's everyday life, increase awareness of alternative forms of energy and promote the Carbon neutral Turku 2029 goal.
27. TVT Asunnot Oy: Lämpökuuri campaign	TVT Asunnot Oy	Nitro, the target group (residents) have an important role	The Lämpökuuri campaign actively communicates about saving on heating and focuses residents' attention on room temperature. The key message is that an indoor temperature of 20-21 degrees is energy-efficient and recommended for health.
28. TVT Asunnot Oy: Vesikuuri campaign	TVT Asunnot Oy	Advertising agencies SST and Nitro and the target group, in other words residents	The goal of the Vesikuuri campaign was to reduce water consumption and especially the use of hot water at TVT locations. The goal was to reduce water consumption by 10%, which meant one bucket of water less per day for each resident. By updating water use habits and saving water, the aim was also to reduce the pressure to raise rents.
29. The Student Village Foundation of Turku, housing location Aitiopaikka: solar electricity	Turku Energia, FinnWind, YIT	The Student Village Foundation of Turku	The Aitiopaikka location is an energy-positive building. It has 515 solar panels (total power 165 kWp) that produce more energy than the location can use. The energy produced by the solar panels can be distributed in the area. The Aitiopaikka housing location has 255 apartments.
30. The Student Village Foundation of Turku, Tyysija housing complex: recovering heat from wastewater	The Student Village Foundation of Turku	Turku Energia, potentially Turku University of Applied Sciences, construction developers will be selected later.	Tyysija is an environmentally friendly form of student housing. The building produces carbon-neutral electricity and utilises energy that has already been flushed down the drain once.

Card number and name	Main executing body	Other executing bodies	Target of the measure
31. The Lean Heat system of VASO	Varsinais-Suomen Asumisoikeus Oy	Property managers, interaction with residents, Lean Heat service producer	Optimises and improves the efficiency of heating energy use in buildings while maintaining a high level of home comfort and a healthy living environment for residents.
32. VASO: Passive-energy house Soininen	Hartela Oy as the contractor	Arkkitehtitoimisto Kimmo Lylykangas as the architect, City of Naantali, TEKES, ARA and RAKLI	The aim is to build a property containing semi-detached and terraced homes that meet the Finnish passive house criteria.
33. VASO: transitioning to renewable energy in renovation projects	HVAC designers and contractors implementing forms of energy (to be selected through competitive tendering)		A shift to renewable energy in renovation projects: The use of fuel oil as a heating method will end at all Vaso properties.
34. Carbon neutrality in City of Turku food services	Turku City Group, strategic procurement	The Finnish Environment Institute, Arkea Oy	In cooperation with the Finnish Environment Institute (SYKE), the City of Turku examined the key sources of carbon dioxide emissions in the City of Turku's food services. The report provided information on the key factors affecting emissions.
35. Steam production plant in Artukainen	Turku Energia	Bayer Oy, Nestlé Finland Oy, Oy Lunden Ab Jalostaja, PCAS Finland Oy and Eckes-Granini Finland Oy	The new steam production plant built by Turku Energia in Artukainen will reduce the use of heavy fuel oil in Turku Energia's production and decrease carbon dioxide emissions.
36. Flue gas condenser of Naantali multifuel power plant	Turun Seudun Energiantuotanto Oy		Improves energy efficiency in district heating production. Turun Seudun Energiantuotanto Oy will invest in a flue gas condenser at Unit 4 of the Naantali power plant in order to improve the energy efficiency of district heating production in the Turku region and reduce carbon dioxide emissions.
37. Turku Energia's largest solar power station contributes to the construction of Meyer Turku cruise ships	Turku Energia	Finnwind Oy, Meyer Turku Oy	The new solar power plant will reduce carbon dioxide emissions by more than 100 tonnes per year. The solar power plant supports the environmental targets of Meyer Turku Oy and Turku Energia.
38. The solar thermal solution of the Market Square and the underground parking facility	Toriparkki Oy	City of Turku, Turku Energia and nollaE	The Market Square and Toriparkki parking facility will gradually become energy self-sufficient.

Card number and name	Main executing body	Other executing bodies	Target of the measure
39. More sustainable choices in planning congresses	Support from the Congress Services of the City of Turku	Support from the City of Turku Congress Services Collaboration partners of the City of Turku Congress Services: meeting and banquet facilities, hotels and producers of additional programmes in the Turku area	The goal is to develop a congress city that respects future resources and green values.
40. Reducing emissions from ship traffic	Meriaura Group		The aim is implement maritime logistics with the lowest possible amount of emissions.
41. Lämpöä project	Turku University of Applied Sciences Ltd		The aim of the Lämpöä project is to promote the utilisation of waste heat and seasonal storage of thermal energy.
42. Sixth-wave smart and resource scarce business operation	Bastu / The University of Turku's Bastu business development programme	Quadruple Helix network consisting of over two hundred operators that represent business, the public sector, research and expert organisations and civil society	Bastu's task is to enable and support reference projects for sustainable business and to integrate university-based innovations into the network. Bastu links the foresight competence of the Finland Futures Research Centre (FFRC) to the concrete needs of companies. Bastu helps companies act in a climate-responsible manner and produce low-carbon product and service concepts.
43. Valonia energy guidance	Valonia		Valonia offers residents of Southwest Finland guidance on informed energy use and purchases.
44. The University of Turku to become carbon-neutral by 2025.	University of Turku	Suomen yliopistokiinteistöt Oy, Turku Technology Properties	The University of Turku is committed to implementing measures that will make the university carbon neutral. The University of Turku will critically examine all its activities, strengthen its existing good practices and develop completely new operating methods to ensure carbon neutrality.
45. Reports on mobility on the way to work and school – a means to find effective measures for reducing emissions.	Valonia		The goal of the reports was to find effective ways of reducing the carbon dioxide burden caused by trips to work and school.
46. System for recycling furniture	The Employment Services Centre and the Project Development Unit	Education Division	The system aims to promote the City of Turku's strategic goal of extending resource wisdom to all activities. The goal is to create the conditions to support the efficient circulation of the city's movable property between units, to enable the internal circulation of materials in the city, increase the visibility of the available materials across sectoral boundaries and reduce unnecessary external purchases. A further goal is to produce meaningful work for rehabilitative work activities.

Card number and name	Main executing body	Other executing bodies	Target of the measure
47. Increasing the participation of elderly people in planning public transport	Valonia	Welfare Division	The goal of the project is to promote sustainable forms of mobility for older people by increasing their participation and age-friendliness when planning public transport and its services.
48. Small steps in an important area!	Forum Marinum Foundation	Turku University of Applied Sciences, Föli	The goal is to reduce carbon emissions on the city's streets by supporting low-emission mobility for staff when they commute and handle work-related errands.
49. Saving energy	Vuokrakartio Oy		The goal was to reduce annual heating costs by more than 50% and electricity consumption at properties by 30%.
50. Heat pump facility in Kakola	Turun Seudun E-nergiantuotanto Oy		The aim is to produce ecological district heating and district cooling for Turku residents.
51. Solar power station in Kupittaa	Turku Energia	Turku Energia, Turun Seudun Vedenpuhdistamo	Renting a signature panel allows people to make a sustainable choice for environmentally friendly renewable energy.
52. Pellet plant in Luolavuori	Turku Energia	Turku Technology Properties	The new pellet plant will replace the production of oil-fired heating plants and reduce the use of oil in Turku Energia's own reserve and peak production.
53. Hobby taxi experiment, piloting a model being created to combine the rides to hobbies in families with children	Valonia	Kyyti Group Oy	The goal of the measure is to develop a model that facilitates transport to hobbies for families with children and promotes sustainable forms of mobility in everyday life. The service model based on shared transport reduces the need for private car use and subsequently also reduces traffic emissions.
54. Bringing together regional climate work and advancing targets, for example, through roadmap work	Valonia	Regional Council of Southwest Finland, Economic Development Centre of Southwest Finland, Finnish Environment Institute	Promotes regional cooperation throughout the region to achieve carbon neutrality.
55. Disseminating environmental education operating models to schools and day-care centres. Examples include learning about the life cycle of food in early childhood education or exploring bodies of water close to schools.	Valonia	Sateenkaari Koto ry, the City of Turku Education Division, Koulujemme lähivedet network, Economic Development Centre of Southwest Finland	The aim is for children and young people to internalise a new circular economy approach and also bring new sustainable development practices to the operating culture of schools and day-care centres.

Card number and name	Main executing body	Other executing bodies	Target of the measure
56. Climate networks	City of Turku and Turku City Group	ICLEI, UBC, CDP, Siitra, CLC, universities and development organisations	Turku will increase its participation in national and international climate networks.
57. Work for the environment	Turun Ekotori Reuse Centre / Kestävän Kehityksen Yhdistys ry	Lounais-Suomen Jätehuolto Oy, Pääkaupunkiseudun Kierrätyskeskus Oy, Niemi Palvelut Oy,	The aim is to promote the reuse of goods and extend their life cycle, promote recycling and the circular economy, and make recycling easy. Another aim is also to raise awareness of consumption habits and reduce unsustainable overconsumption.
58. Waste food pantry	Turun Ekotori Reuse Centre / Kestävän Kehityksen Yhdistys ry	Leipomo Salonen / surplus bread and buns, Laitilan Wirtovoiutusjuomatehdas / provider of fridge for waste food	The aim is to raise awareness of consumption habits and food waste, and to reduce unsustainable overconsumption and food waste.
59. Low-carbon taxi transport	Lounais-Suomen Taxidata Oy	Contract drivers who are subcontractors of/supplied by Taxidata, and who drive electric, gas and hybrid vehicles.	Our goal is to contribute to creating a carbon-neutral city with the mobility services taxi fleet.
60. Carbon-neutral alcoholic beverage factory	Pernod Ricard Finland Oy	Turku Energia (district heating and steam supplier), Eckes-Granini Finland Oy Ab (property owner)	Our goal is to achieve carbon neutrality in terms of the energy used at our plant.
61. Let's Make Air Great Again	SF-Lämmitin Oy		We encourage boat and cottage owners to use biodiesel for heating.
62. A reformed biogas plant for Topinpuisto	Gasum Oy	Turun seudun puhdistamo oy, Lounais-Suomen Jätehuolto Oy	We will increase biogas production, offer it as a transport fuel and facilitate its transport by liquefaction. We will simultaneously make a significant contribution to the circular economy.
63. Utilising biowaste that has ended up in mixed waste as fuel	Gasum Oy	Lounais-Suomen Jätehuolto Oy, Lounavoima Oy	Gasum is working with Lounais-Suomen Jätehuolto and Lounavoima to find a solution that makes it possible to utilise biodegradable waste that is mixed with combustible waste in biogas production at the future eco-power plant.
64. Meyer / Carbon neutrality measures	Meyer and its partners	Turun seudun puhdistamo oy, Lounais-Suomen Jätehuolto Oy	Meyer Turku Shipyard promotes the reduction of greenhouse gas emissions in its operations and its production chains.
65. University of Turku / Flavoria, The food of tomorrow / towards sustainable food.	The University of Turku Functional Foods Forum	Medisiina D and its owners and users, partners	The University of Turku Functional Foods Forum develops sustainable and healthy nutrition and the food chain using new methods in the Flavoria restaurant research-testing-development environment. The solutions help to reduce the climate impacts of food.

Card number and name	Main executing body	Other executing bodies	Target of the measure
66. Utilising non-recyclable waste as local energy	Lounavoima Oy	Lounais-Suomen Jätehuolto Oy, Salon Kaukolämpö Oy	Burnable waste in the Turku region is used as energy at the Korvenmäki eco-power plant in Salo.
67. Topinpuisto circular economy centre	Lounais-Suomen Jätehuolto Oy	City of Turku, Business Turku, Turku University of Applied Sciences	New circular economy business is being developed at the Topinpuisto circular economy centre in collaboration with companies and with support from the circular economy network. Innovations are built to utilise material, water and energy flows and to develop services.
68. Enhancing transport and treatment of sewage sludge in the sparsely populated area	Lounais-Suomen Jätehuolto Oy		The transport of sludge from properties that are not connected to the sewer network is organised efficiently by the municipality through competitive tendering.
69. Enhanced recovery of landfill gas	Lounais-Suomen Jätehuolto Oy		The release of landfill gas from the Topinoja waste treatment centre into the atmosphere is prevented by using surface structures to close off the landfill area and then collecting and utilising the gas that forms.
70. Improving separate collection of biowaste	Lounais-Suomen Jätehuolto Oy	Turku Region Waste Management Committee, Biolinja Oy	The share of separately collected biowaste will be increased by improving property-specific collection and developing services. Residents' participation in sorting biowaste is supported through activities focused on food waste and biowaste sorting.
71. LSJH / Turku University of Applied Sciences Processing of recycled textiles	Lounais-Suomen Jätehuolto Oy	Turku University of Applied Sciences Ltd, Ekopartnerit Turku Oy, Gasum Oy, Kaivoasema Oy, Kuusakoski Oy, Turun Maisemointi Oy	LSJH and Turku University of Applied Sciences and their partners have created the prerequisites and are working to implement a significant recycling textile processing solution in the Topinpuisto area. This will reduce the consumption of materials and energy as well as emissions in the textile industry.
72. Solar electricity system for the wastewater treatment plant in Huittinen	Turun Seudun Vesi Oy	Salo Solar Oy	A solar panel system producing electricity will be installed at the wastewater treatment plant in Huittinen. The wastewater treatment plant in Huittinen is one of the largest energy consumers in the drinking water production system. The objective of the measure is for the plant to produce some of the electricity it needs.
73. Generating energy from water flow	Turun Seudun Vesi Oy		The turbine located deep in a rock cavern in Saramäki regulates the flow of water from the Virttaankangas managed aquifer recharge plant while simultaneously producing emission-free electrical energy. This provides the energy needed to pump drinking water to Turku, Raisio and Naantali.

Card number and name	Main executing body	Other executing bodies	Target of the measure
74. Utilising heat energy of drinking water	Turun Seudun Vesi Oy		The artificial groundwater produced by Turun Seudun Vesi Oy is at its warmest in winter (unlike the water produced by a surface water plant or groundwater plant). It may be possible to lower the temperature of artificial groundwater by 2–4 degrees during the winter season and utilise that heat for district heating production with a heat exchanger. A potential site for heat recovery from drinking water could be the Halinen water utility area, where a new backup water treatment plant will be built in the next few years. The pre-requisites for heat recovery are being taken into account in the design and implementation of the backup plant.
75. Turku Stars Carbon Neutral City Experience for Kids and Youth	Zeamy Oy	Business network founded by Zeamy Oy in collaboration with the City of Turku	Turku Stars Carbon Neutral City Experience for Kids and Youth is an innovative and interactive street space innovation for urban new generations; a city lab, science hub and interactive street experience. Implementation of the concept is built on smart city infrastructure, applying and further developing the services offered by companies in the business network and utilising climate and open data.
76. Cutting of reed beds and advancing the circular economy of reed material	RH-Harvesting Oy	Currently seeking partners/investors	Water areas have great energy potential, and more extensive utilisation of this potential would reduce emissions and eutrophication in water bodies. RH-Harvesting Oy is an innovative company that builds multi-purpose vessels suitable for harvesting aquatic plants. The vessels mow and bale reed for circular economy needs, for example, as growing media and for energy use.
77. Emission-free Cathedral Park Terrace	Turku Food & Wine Fest Oy	Maxus, Peipponen Express Oy, RSA Suomi	The coronavirus pandemic resulted in the construction of a summer terrace area in Turku's Cathedral Square. Turku Food & Wine Fest Oy, which operates the area, decided to use electric cars to handle logistics in a carbon-neutral manner. The terrace area also uses carbon-neutral electricity. Peipponen Express Oy and RSA Suomi are also involved in implementing this climate measure.
78. Emission-free distribution in the city centre	Peipponen Express Oy and RSA Suomi		GLS Finland has set a goal of offering carbon-neutral transport services. The first step towards this goal is being taken in Turku city centre, where GLS Finland's partner Peipponen Express delivers packages using fully electric vehicles.

Card number and name	Main executing body	Other executing bodies	Target of the measure
79. Lieke electronic library bus	Turku City Library	JETI Industries Ltd and Turun Anikistit ry	A decision was made to replace one of the library's two mobile libraries with a fully electric mobile library, which was introduced in June 2020. The vehicle itself produces no carbon dioxide emissions, even though the production of electricity does cause emissions. We have calculated that our new mobile library vehicle (Lieke) produces 6,552 kg less CO ₂ per year than our combustion engine-powered mobile library.
80. Reducing the carbon footprint of the school and day-care centre menu	Arkea Oy	City of Turku, Turku University of Applied Sciences	The carbon footprint of school meals has been reduced by replacing some of the minced beef in school meals with low-emission alternatives. Depending on the food, reducing the proportion of beef in recipes reduces the carbon footprint of meals by up to 30-50%. When approximately 25,000 food portions are produced daily, this emissions reduction is very significant.
81. Carbon-neutral property investments by 2030	Veritas Pension Insurance		Veritas Pension Insurance is aiming for carbon-neutral property investments by 2030. Buildings account for more than 30% of Finland's energy consumption. Property investment activities have huge potential for reducing emissions.
82. Calculating the carbon footprint of a microbusiness	MuotoMyrsky Oy	Carbonwise project Turku University of Applied Sciences	Finland's 187,000 sole entrepreneurs have great potential for emission reductions. Muotomyrsky mapped a path to carbon neutrality for micro-enterprises. In addition to its own climate action, the aim was to show that even small operators can do great things.
83. Carbon-neutral Bar Ö	Flegma Oy	HNRY-koulutus (training on carbon-neutral resource-wise business), Jussi Kallio (Green Event)	Flegma Oy examined the climate impacts caused by the operations of the Bar Ö facility that it owns. Emissions were calculated and potential targets for emission reductions identified. Bar Ö switched to carbon-neutral electricity and other emissions will be offset from 2020 onwards.
84. Planet Company service for communications on climate and corporate responsibility actions	The Planet Company Oy		The Planet Company online platform provides a tool for companies, communities and cities to share their best climate actions globally. The Turku-based service makes it possible to learn and copy good practices directly to a company's activities.

Card number and name	Main executing body	Other executing bodies	Target of the measure
85. Infraroad Oy has taken renewable fuels into use in all equipment	Infraroad Oy		Infraroad's fleet currently includes almost 30 machines and vehicles, in which renewable products are being implemented immediately. By replacing fossil diesel and fuel oil with Neste's renewable alternatives, the estimated emission reductions on Infraroad's total consumption in 2021 would be equivalent to removing an average of 360 passenger cars from Finnish road traffic for one year.
86. Improving the nutrient cycle as part of biogas plant renovation	Gasum	Turun Seudun Puhdistamo, Lounais-Suomen Jätehuolto Oy and partners in industry and nutrient use	Finland's first biogas plant producing liquefied biogas is located in Topinoja, Turku. The raw material for Gasum's biogas plant is biowaste from consumers and companies. Using biogas instead of traditional fuels can significantly reduce greenhouse gas emissions from transport.
87. Accelerating sustainable development in Science Park with local businesses	Turku Science Park Oy	City of Tampere, City of Espoo	Turku Science Park accelerated the sustainability challenges of eight companies by finding ideas and solutions for them from growth companies. The solutions were produced as part of the 6Aika Sustainable Urban Districts Partnership Model (KIEPPI) project. The solutions reduced carbon emissions and promoted the circular economy.
88. Advancing cycling in Turku	Turun Pyörämessut Oy	City of Turku and several private sector and third sector operators	Replacing car journeys with cycling automatically reduces carbon dioxide emissions. The aim of Turun Pyörämessut is to advance and increase cycling in all conditions, and it therefore has a fairly direct climate impact if car use is even partly replaced by cycling.
89. Delivering parcels in Turku city centre emission-free	Peipponen Express Oy and GLS Finland Oy		GLS Finland has set a goal of offering carbon-neutral transport services. The first step towards this goal is being taken in Turku city centre, where GLS Finland's partner Peipponen Express delivers packages using fully electric vehicles.
90. Combined production of district heating and district cooling with an efficient heat pump	Oilon Oy	RESPONSE project, Turku Energia, VTT Technical Research Centre of Finland Ltd, Högfors GST	A heat pump supplied by Oilon Oy for the RESPONSE project operates in the Tyysija student housing complex in Turku. The heat pump has combined heat and cooling production.
91. Combined production of district heating and district cooling with an efficient heat pump	HögforsGST Oy	RESPONSE project, Turku Energia, VTT, Oilon Oy	The overall system designed and manufactured by HögforsGST Oy handles heating and cooling at the new Tyysija student housing complex built in the Turku Student Village. According to the basic operating principle of the system, the heat pump cools the district cooling network and the condensate energy obtained from it is primarily used to heat the Tyysija property. The excess heat is transferred to the district heating network.

Card number and name	Main executing body	Other executing bodies	Target of the measure
92. Promoting the circular economy in library services	Turku City Library		The library is committed to implementing one climate action every year, and in 2022 the library committed to promoting the circular economy. All library lending services and shared use devices promote the circular economy, as library users do not need to buy the products and devices themselves. The library can increase circular economy awareness at a low threshold and bring it closer to city residents.
93. Pargas produces fuel from carbon dioxide emissions	Q Power	Power-to-X	Q Power uses Power-to-X technology to produce carbon-neutral, synthetic fuels that can replace fossil energy. The patented microbiological process utilises carbon dioxide that can be captured from industrial flue gases or a biological source. Together with green hydrogen, the carbon dioxide produces renewable methane in Q Power's bioreactors,. This can be used to directly replace fossil natural gas in, for example, transport, industry or the natural gas network.
94. Heat pump	Orion	Calefa Oy	A heat pump plant was built at Orion's Turku location. It utilises the waste heat from Orion's own production process and energy from outdoor air as heating energy in the district heating network in the factory area. The district heating network in the same factory area was converted into a district heating network.
95. Carbon-neutral production plant in Turku	Bayer		Bayer reduced its emissions in Finland by up to 89% in just three years. The remaining emissions are offset in their entirety. The majority of the company's carbon dioxide emissions are generated at the Turku pharmaceutical factory, where emissions have been significantly reduced by switching to renewable energy.
96. Moving to new facilities	Ejot Sormat Oy		EJOT Sormat Oy moved to a new property where sustainable development was taken into account as an important part of design and implementation. The aim was to create new, functional and long-lasting facilities that are designed to have a significantly lower environmental impact than the old premises. When planning the property, particular attention was paid to the recovery of waste heat and energy efficiency, as well as the circulation of materials.
97. Mechanical recycling of end-of-life business textiles into new raw materials	Rester Oy		Mechanical recycling of end-of-life business textiles into new raw materials.

Card number and name	Main executing body	Other executing bodies	Target of the measure
98. Kesärauha is becoming a carbon-neutral festival	Kesärauha, Sunborn events Oy		The Kesärauha festival has reduced emissions in areas such as event logistics and catering. The festival also aims to increase the environmental awareness of its customers through circular economy art and event communications.
99. Turku Forest Network Study	City of Turku		Turku Forest Network Study Implementation of the Turku Forest Network Study began in November 2021 and was completed in 2022. The purpose of the study is to illustrate the current state of the forest ecological network in the entire Turku area.
100. Study of potential afforestation areas	City of Turku		As a follow-up to the proposal for the forest network in Turku, a study of potential afforestation areas throughout the city was carried out as part of the city planning process in January–March 2023 with funding from the Canemure sub-project. The study specified areas suitable for afforestation and smaller-scale tree planting on land owned by the city.
101. Carbon-neutral Paavo Nurmi Games by 2029	PNG Turku Oy		Paavo Nurmi Games is carbon-neutral by 2029. The goal will be achieved by minimising the environmental impacts of the event through choices made by the event organisers. The carbon footprint of PNG will be calculated for the first time in 2023. This will provide data on the emissions caused by the event and information on where emissions can be further reduced.
102. Åbo Svenska Teater's environmentally produced Storm play	Åbo Svenska Teaterförening r.f		The Storm play is Åbo Svenska Teater's most environmentally friendly production so far. The methods used to reduce climate emissions include using LED lights in the performance and extensive use of recycled materials in the set design and costumes.
103. Implementation of nature-based solutions in urban stormwater management	City of Turku		To implement nature-based solutions in urban stormwater management.
104. Reducing emissions when organising business and personnel events.	Idea Group Oy		Idea Group organises low-emission business and personnel events with customers, and calculates the carbon dioxide emissions of the event for the customer.
105. A tramway from the Port to Varissuo	Turku Tramway	City of Turku	A tramway from the Port to Varissuo enables low-carbon mobility and a sustainable everyday life for city residents by increasing the types and amount of sustainable mobility in Turku. The tramway also supports urban development and serves the growing need for public transport on main routes.

Card number and name	Main executing body	Other executing bodies	Target of the measure
106. Implementing the EU taxonomy in the City of Turku's investment processes	City of Turku		Implementation of the EU taxonomy in the City of Turku's investments with the aim of producing projects that comply with the taxonomy. The taxonomy criteria have been introduced in investment processes through training.
107. Promoting electric charging in city properties	City of Turku		The City of Turku will build charging points on its properties from 2023 onwards. In the first phase, charging points will be purchased for approximately 70 properties. The charging points will be available to both city employees and residents on a case-by-case basis. Starting in 2024, the number of charging points at properties will be increased according to need.
108. Promoting electric charging in the city infrastructure	City of Turku		One of the project's objectives in Turku is to promote the use of public charging points by drawing up a general plan for electric charging that covers the entire city. At this time, Turku has less than 200 charging points available for public use. The general plan aims to prepare for an increasing number of electric cars and other electric vehicles and to guide the development towards a good and functional outcome.
109. Increasing and supporting biodiversity in the yard area of a location	Otesäätiö		Otesäätiö promotes local biodiversity. Finland's largest insect hotel has been established in the yard of the Raisio location. The meadow area established in 2023 will be developed this year by planting a larger wildflower meadow.
110. Steps towards carbon neutrality	Alumeco Finland Oy Ab	Alumeco AS, Metalcenter Group Oy Ab	Monitoring the company's corporate responsibility activities with a ISO14001 certificate. The aim is to provide customers with information on the emissions caused by products and transport.
111. Calculating LCA for patient monitors	GE Healthcare Finland		GE Healthcare Finland examined the carbon emissions and environmental impacts of its patient monitors during the development, production and use phases. Based on the results, customers are guided towards low-emission use of products. The energy-saving potential of products will also be improved.
112. Carbon-neutral shipyard 2030	Meyer Turku		Carbon-neutral shipyard 2030

Card number and name	Main executing body	Other executing bodies	Target of the measure
113. Supporting biodiversity in detailed land use planning	City of Turku		In land use planning, work to promote biodiversity begins with an ecological survey at the local detailed plan level. Based on the survey, planning designations can be made, for concerning new habitats, habitats of endangered species and the preservation of valuable nature areas. Land use planning can thus be used to preserve and strengthen ecological connections and habitats of endangered species.
114. Assessing the climate impacts of detailed plan areas (ILVA)	City of Turku, Canemure project		Assessment of the climate impacts of detailed plans (ILVA) should start at the beginning of a city planning project. The instructions provide guidance on what to take into consideration in each phase of the plan, and the table that is filled in illustrates an assessment. The assessment is updated as the preparation of the city plan progresses. The assessment table focuses on the impacts of greenhouse gas emissions and the climate resilience of the community.
115. Clean energy through inventiveness	Turun Seudun Energiantuotanto Oy		The process of the electric boiler at Naantali power plant was modified so that it can produce district heating in addition to steam. Inventive solutions and efficient resource use can reduce energy consumption in many different locations.
116. Transition towards carbon-neutral port operations	Port of Turku		The Port of Turku is moving towards carbon-neutral operations by investing in the use of renewable energy. The company's own vehicle fleet – both vans and machines – has been electrified to the extent permitted by the market. Charging points for electric cars will also be added in the port area. The port has introduced an automatic mooring and unmooring system to reduce emissions from passenger ships during docking. The lighting in the area has been replaced with LEDs with digital control features. Employee bicycles have been introduced for a large proportion of employees. Future projects and investments will focus on promoting renewable energy and low-emission solutions.

Card number and name	Main executing body	Other executing bodies	Target of the measure
117. Carbon-neutral parish union 2029	Turku and Kaarina Parish Union		The goal of the Turku and Kaarina parish union is to be carbon neutral in 2029. The carbon footprint and carbon sinks will be calculated in 2023, after which their development will be monitored. All electricity and district heating are produced in a renewable manner. The machinery used in the cemetery runs on biodiesel, and battery-powered equipment is being purchased to replace internal combustion engine machines. A flue gas cleaning system has been built in the crematorium, and the heat recovered from the flue gases is used for heating. Oil heating has mainly been replaced by ground source heating or district heating. Parishioners and parish employees are encouraged and included in climate and environmental actions through active communication. Employees are encouraged to use sustainable transport, for example, the staff at cemeteries move around on bicycles or electric kickbikes.
118. The parish union increases biodiversity	Turku and Kaarina parish union		One of the goals of the Turku and Kaarina Parish Union's environmental programme for 2023–2027 is to increase biodiversity. The areas bordering on the cemeteries and enlargement areas are maintained with infrequent mowing. Hundreds of birdhouses have been placed in the cemeteries. The rocky meadow beside Piikkiö vicarage is maintained by mowing. Flower bulbs have been planted in the yard at Kaarina Church and on the hill at Michael's Church, and approximately half of the grass areas at St. Henry's Church are gradually being turned into meadows. Potential METSO (Forest Biodiversity Programme) conservation sites were surveyed in connection with the forest management plan. Rugosa rose bushes have been removed from cemeteries and property yards. New tree species are added when the trees in cemeteries are replaced. Strengthening the relationship with nature is a strong theme, especially in early childhood education and care.
119. Employee bicycle benefit	City of Turku		The City of Turku introduced an employee bicycle benefit in early summer 2023. The benefit functions according to a leasing model. The employee must have been employed for at least one year to be eligible for the benefit.

Card number and name	Main executing body	Other executing bodies	Target of the measure
120. Towards carbon neutrality with solar power systems	Elcon Solutions Oy		We are piloting the production of solar power and battery technology for its storage. The aim is to produce commercial products that can be sold to customers and thus multiply the climate action. We also supply backup systems to industry and electricity network operators to secure energy distribution. In 2022, we delivered a 50kWh battery storage system to the Turku Student Village Foundation's Tyyssija housing complex as part of the Response project. In 2023, we installed a 60 kWp solar power system in our own premises, which will be supplemented with a 50 kWh battery storage system. We have electric vehicle charging points and heating points in the yard at our premises. Our premises are heated with air-source heat pumps, and the energy we use mostly comes from our own solar power. All the energy we purchase is renewable.
121. Climate resilient daycare centre and school menus	Kaarea		In autumn 2023, the climate burden of meals were illustrated on school menus using visible symbols: a footprint, a colour code and the amount of CO ₂ . The burden was estimated using the emission factors calculated for raw materials by the Natural Resources Institute Finland. In August 2023, a new vegetarian option was also introduced for all children in primary schools (previously only available in secondary schools, general upper secondary schools and vocational institutions). In general, the climate work done in school and day-care centre food includes significantly reducing the amount of beef and increasing the amount of fish and plant-based protein. Plant-based protein has been added to the menu in cooperation with a customer panel made up of schoolchildren. Development collaboration with the food industry has also focused on plant-based protein and local fish. The basic menu at day-care centres and schools in Turku is at a sustainable level. Sustainability work related to food will continue.

Card number and name	Main executing body	Other executing bodies	Target of the measure
122. Updating the property services vehicle fleet	Kaarea		Kaarea is combatting climate change in property services by renewing its vehicle fleet and reducing its carbon dioxide emissions. Kaarea has updated its vehicle fleet by replacing some of the vans with electric cars and switching to environmentally friendly biodiesel for diesel-operated cars. The vehicle fleet has been renewed over the past three years. Kaare's diesel vans now run on Neste MY Renewable Diesel, which is 100% produced from waste and residues. Old vans have also been decommissioned and five new electric vans purchased to replace them.
123. GreenImpact functionality in the Föli application	IQ Payments Oy		iQ Payments has added the GreenImpact functionality to the Föli application. This automatically detects the user's modes of transport and calculates their carbon footprint. For every 5 kg of carbon dioxide saved, the user receives a climate coin that can be redeemed for discounts from partner companies. The aim is to use gamification methods to encourage users to reduce the carbon footprint of their mobility. Companies can use the GreenImpact Commuter Benefit management system, which combines the provision of commuter benefits with carbon dioxide calculation and reporting.
124. Carbon neutral reuse of industrial side streams	TM Systems		The company's new product is SuperDryer™, a drying system for various biomasses, including material streams classified as waste, in industrial-grade drying processes. The technology is based on the fact that the drying process produces a high-quality end product in an emission-free and energy-efficient manner. SuperDryer also minimises the carbon footprint of logistics related to side streams. The technology enables the utilisation of side streams that could not previously be used. The SuperDryer is designed to run on renewable energy and replaces old, polluting and energy-consuming technologies. The scalable technology is suitable for the needs of large production plants and small local units.

Card number and name	Main executing body	Other executing bodies	Target of the measure
125. Capturing emissions from industrial processes	TM Systems		The Zero-Ex® product is an emission capture technology designed to capture gas, steam and eliminate odours in industrial processes. It also contains significant energy recovery potential and provides environmental benefits. Zero-Ex® was developed to solve air pollution challenges while saving energy and water in the pulp and paper industry, mechanical wood industry, food industry, textile industry, etc. Zero-Ex® helps to reduce air emissions in highly polluting industries.
126. Manual work further sustainability in restaurant activities	Kakolanruusu restaurant		Kakolanruusu is part of the Sustainable Travel Finland programme, which includes a sustainable tourism development path. The restaurant favours seasonal ingredients, locally produced products, organic products and fair trade. We cooperate with smaller local operators in the surrounding area. The menu is available in vegan form, and different diets and menu flexibility are taken into account during the planning stage to avoid food waste. Surplus food is used creatively, for example, in drinks. We preserve products of the harvest season for use throughout the year. We do a lot ourselves, which reduces the amount of packaging waste. Our premises uses district heating and district cooling, and we purchase renewable energy. One of our cars is a hybrid model, which makes it possible to handle all local driving with electricity.
127. Biofuel reduces cruise ship emissions	Viking Line		Liquefied biogas (LBG) was introduced in passenger and freight transport in 2023. Viking Line offers its customers the option to add a biofuel surcharge to their travel booking. This means that the amount of fossil energy that the ship would have consumed during the transportation is instead replaced with renewable biogas. Initially, the option to purchase the biofuel surcharge is available on all sailings with Viking Glory and Viking Grace. The raw material used to produce biogas is waste streams generated in society, such as food or agricultural waste, so its production also promotes the circular economy. During refuelling, biogas is mixed with LNG (natural gas), which is also a low-emission fuel compared to oil-based fuels.

Card number and name	Main executing body	Other executing bodies	Target of the measure
128. Hansakortteli green terrace	Hansakortteli shopping centre	Lehmuksen Alla	The Hansakortteli shopping centre has a green rooftop terrace, which is being developed in cooperation with a local gardening company. Cutting flowers and useful plants are cultivated on the roof. The roof also has bat nests, birdhouses and an insect hotel. The aim is to support biodiversity. Biodiversity measures are linked to our broader sustainability efforts. We involve young people from the youth centre in caring for useful plants.
129. Climate friendly play and physical activity	Puuha Group		Puuha Group aims to achieve carbon neutrality in its own activities by 2029. In 2022, the carbon footprint was calculated for both production and products. The company has an ISO 14001 environmental certificate, and this is also used to monitor responsibility. The company has focused on a short supply chain, favours local suppliers, has audited its metal suppliers, improved the use and recycling of packaging materials, and started using local operators in its installation activities. Puuha Group has also been able to influence the material choices made by component suppliers and manufacturers of intermediate products, for example, by encouraging the use of recycled plastic. In connection with renewing its products, the company switched to modular production, which reduced the need for storage and the fastening components by 30%. We also try to influence the life cycle of products, for example, through maintenance activities.
130. Sewage from ships	Meriaura		Meriaura has developed the management of sewage produced by its ships so that it is no longer released into water bodies in any situation but is instead discharged to wastewater treatment facilities at ports.

Card number and name	Main executing body	Other executing bodies	Target of the measure
131. Climate-neutral cruise ship	Meyer Turku		The aim is to complete the climate-neutral cruise ship concept by 2025, after which Meyer will be ready to move on to designing and manufacturing a climate-neutral ship. The leading company project is looking for new, more sustainable materials and solutions for elements such as cabins, studying optimisation of the ship's hull and steel structure to reduce fuel needs and planning more efficient waste systems. The emphasis in terms of emissions is on fuel use over the ship's entire life cycle. The climate-neutral cruise ship will reduce these emissions, as it can use low-carbon fuels of the future. Increased energy efficiency also means that the cruise ship will consume less fuel than previously.
132. Sustainable and responsible RDI activities	Turku University of Applied Sciences		In RDI activities at Turku University of Applied Sciences, projects are assessed using ecological, economic and social sustainability criteria (before, during and after the project). The purpose of these criteria is to bring more projects that implement climate and nature targets to the university. Projects that support those targets bring innovation impact to the region and lead to collaboration with companies. The projects will also create new expertise in the region.
133. Sustainable archipelago tourism	Villa Wolax		Activities at Villa Wolax focus on sustainable and responsible tourism. The hotel monitors the environmental burden caused by tourism and measures the impacts of its activities. The staff are trained to act in a responsible manner. Customers are also encouraged to participate in reducing energy and water consumption. The work to develop responsibility will continue in the Sustainable Travel Finland programme.
134. Turku Seudun Vesi's new nature reserve protects the unique esker landscape and nature of Virttaankangas	Turun Seudun Vesi		Based on an initiative made by Turun Seudun Vesi, Economic Development Centre of Southwest Finland has established a private nature reserve covering approximately 40 hectares on the Järvenkangas property in Virttaankangas, which is located in Loimaa. The reserve is located in an important groundwater area and is part of the Natura 2000 network. The nature conservation decision also implements national conservation activities and the conservation measures in the national Metso programme, which aims to achieve a favourable conservation status for esker forests, boreal natural forests, clear-water lakes, wooded mires and heath forests.

Card number and name	Main executing body	Other executing bodies	Target of the measure
135. Managing rocky meadows	City of Turku		The City of Turku is committed to protecting and managing rocky meadows as part of the Turku Biodiversity Programme (LUMO). These meadows are typical of the Turku region, but they are a very endangered habitat on the Finnish scale. Rocky meadows are home to many endangered plant and butterfly species. Through the LUMO programme, the City of Turku has cooperated with environmental protection and maintenance to develop a long-term operating model for managing rocky meadows. This model will be used to bring Turku's rocky meadows within the scope of systematic and continuous management. Managing the meadows will improve the habitats for the plants and insects that are found in them.
136. From total emissions calculation to sustainable measures	Teleste Oyj		Teleste renewed its emission calculations. In addition to the traditional Scope 1 and 2 emission categories, Scope 3 emissions, which are indirect emissions occurring in the value chain, were also included in the calculation. After this renewal, the emission reduction targets were updated and a reference year set for them. The emission calculation was used as the basis for identifying the most significant emission sources and new measures were introduced to reduce emissions.
137. Promoting cycling	Onnipyörä		Onnipyörä extends the material cycle by means of maintenance services and recycling activities. The aim of these activities is to increase sustainable mobility in cities and thus reduce carbon dioxide emissions. In addition to selling and servicing bikes, Onnipyörä also engages in advertising that encourages sustainable mobility and communicates about the benefits of cycling.
138. Recycling IT equipment	Atea		Atea helps its customers make sustainable choices throughout the entire life cycle of IT equipment and services. The company's takeback and recycling services help customers extend the life cycle of their IT equipment. After secure data erasure, a large proportion of the decommissioned devices can be reused. Equipment that cannot be reused is sent for physical destruction where the valuable metals are separated for further processing. Decreasing the amount of electronic waste reduces climate emissions and the need for valuable raw materials.

Card number and name	Main executing body	Other executing bodies	Target of the measure
139. Biofuel from frying fat and soil from coffee grounds all over Finland	VG-Port	Berner GreenCare, VG-EcoFuel/Merikura	VG-Port promotes the circular economy by offering free collection services to restaurants and cafés for the recycling of used deep frying fat and coffee grounds. Frying fat is refined to produce biofuel that can be used as fuel for cargo ships, while coffee grounds are used to produce nutrient-rich soil and growing media. Emissions from maritime transport are 98% lower with biofuels in comparison to fossil fuels. In addition to mitigating climate change, domestic fuel supports Finland's security of supply and national economy.
140. Making it easier to drop goods at Ekotori	Ekotori	Lounais-Suomen Jätehuolto Oy (LSJH)	Ekotori promotes the reuse of goods in the Ohituskaista uudelleenkäyttöön (Fast lane for reuse) joint project implemented in cooperation with LSJH. The project promotes recycling and reuse in Turku by combining the reception of waste and reusable goods in one place. Households have been able to bring reusable items to the reception bin at the Topinoja sorting station free of charge when they are dropping off a load of waste at the sorting station. The service meets the growing need to make efficient use of items that are in good condition, while reducing the amount of waste that ends up at waste stations.
141. Promoting sustainable consumption and reducing plastic waste	Greenme Nordic Oy (Pura Nordic)		Greenme Nordic Oy reduces the use of plastic by offering durable, reusable products while also advocating against over-consumption through its own channels. The company shares researched information on plastic pollution and sustainable alternatives through its website and social media channels. The company promotes informed consumption, and all its activities are designed to reduce waste and support responsible consumption.
142. Emission-free Prisma Tampereentie	Turun Osuuskauppa		Turun Osuuskauppa completely renovated the Prisma store on Tampereentie so that its energy use is completely carbon negative, which means the carbon sequestered by the building exceeds the emissions caused by its operation. The methods for achieving carbon negativity include switching from district heating to ground-source heating and replacing the refrigeration equipment and systems in the store. These changes reduce emissions by replacing fossil-based energy solutions with renewable energy and improving energy efficiency.

Card number and name	Main executing body	Other executing bodies	Target of the measure
143. Reducing the amount of mixed waste	Lounais-Suomen Jätehuolto Oy	Lounavoima Oy	The amount of mixed waste generated in housing will be reduced from the starting point of 184 kg/resident/year in 2024 to 140 kg/resident/year. Key measures
144. Development of low-emission sludge management	Lounais-Suomen Jätehuolto Oy		An eco-friendly method will be introduced for septic tank emptying to avoid unnecessary transport of water to the treatment plant. Eco-friendly emptying significantly reduces the unnecessary transport of water and therefore also the number of transports, which reduces transport emissions. Transport emissions will also be reduced by requiring alternative power sources in transport contracts when they are available and by optimising transport routes.
145. Reducing life cycle emissions from buildings	Lounais-Suomen Jätehuolto Oy (LSJH)		LSJH takes energy efficiency into account in new and renovation construction already during the planning stage, with the aim of exceeding statutory requirements. New buildings are built in accordance with energy class A or at least to the level of the limit set for the E-value by the Ministry of the Environment. Energy efficiency is promoted, for example, by using good thermal insulation, energy-efficient window and door choices, utilisation of solar energy, smart heating control and energy consumption monitoring that is also visible for users.
146. Reusing building elements and materials in construction	Lounais-Suomen Jätehuolto Oy (LSJH)		Low-carbon solutions and the reuse of building elements and materials will be favoured in future construction projects, such as the Topinpuisto sorting station. The reuse of building elements reduces the need for virgin materials and therefore also the emissions from their production.
147. Reducing emissions from waste transport	Lounais-Suomen Jätehuolto Oy		According to regional availability, LSJH requires the use of alternative power sources. The aim is that 95% of waste transports from properties will be carried out using alternative power sources by 2030. Optimisation of transport routes will also reduce the driving kilometres. The objective of these measures is to significantly reduce emissions caused by waste transport.
148. Kestävät pakkaukset kasvipohjaisemmilla materiaaleilla	Eckes-Granini Finland Oy Ab		Eckes-Granini on vaihtanut korkki- ja pil-liannospakkauksensa kasvipohjaisempiin materiaaleihin. Uudistetut pakkaukset ovat 86 % kasviperäistä materiaalia, kuten sok-eriruokoa ja puukuitua. Yhteensä päästöjä on uudistuksen myötä vähennetty noin 476 tonnia CO ₂ e vuodessa. Muutos vähentää hiilidioksidipäästöjä ja vie yritystä lähemmäs tavoitetta olla Suomen vastuullisin mehtalo.

Card number and name	Main executing body	Other executing bodies	Target of the measure
149. Responsible food services creating a more sustainable food culture	Linnasmäki Oy	Turun kristillisen opiston säätiö, Linnasmäki College	Sustainability has been made a key part of Hotel Linnasmäki's strategy through Green Key and Sustainable Travel Finland certificates. The sustainability certificates also encourage actors in the supply chains to expand their range of responsible options. For example, at least half of the food is purchased from local producers, and organic and Fairtrade products are favoured when purchasing vegetables and coffee. In addition, the hotel monitors food waste is monitored and has created a responsible food culture.
150. Nature footprint calculation	Greenstep	LUT University	Greenstep calculated its own biodiversity footprint and identified the key impacts of its activities on nature. The calculation is performed annually and the implementation of measures is monitored in connection with the process. Greenstep's own biodiversity footprint calculation was a development project that aimed to build light and cost-effective nature footprint calculation processes that are suitable for SMEs.
151. Sandvik reduces emissions in Turku and around the world	Sandvik, Turku production unit		Sandvik is systematically reducing emissions in line with targets validated by SBTi. Investments are being made in electrification to reduce Scope 3 emissions. The Turku production unit has switched to 100% renewable HVO fuel in machine test runs and initial fuel filling. In addition, the electricity and district heating used at the Turku location are 100% renewable, and the welding gases have been replaced with low-carbon alternatives. The electric mining machines developed in Turku reduce emissions from mining operations on a global scale.
152. Developing climate-responsible tourism	Visit Turku Archipelago		The aim of Visit Turku Archipelago (VTA) is to develop tourism in so that it does not exceed the ecological carrying capacity of the region. The organisation promotes responsible tourism by acting as a sustainable tourism network coordinator for tourism companies in Turku and the Archipelago. VTA also supports companies in the Sustainable Travel Finland (STF) programme, which grants the STF label for long-term and verified work on behalf of sustainable tourism. In addition, VTA leads the 10-year tourism vision for Turku and the Archipelago and the conditions for sustainable growth at the strategic level, and it provides consumers with guidance on making sustainable choices.

ANNEX 6. Climate risk cards

Climate risk cards

The risk cards contain descriptions of the climate risks that have been assessed as the most significant in Turku along with their impacts. The intensity of these impacts is affected by several factors, such as the future development of greenhouse gas emissions and the city's capacity to develop its adaptability.

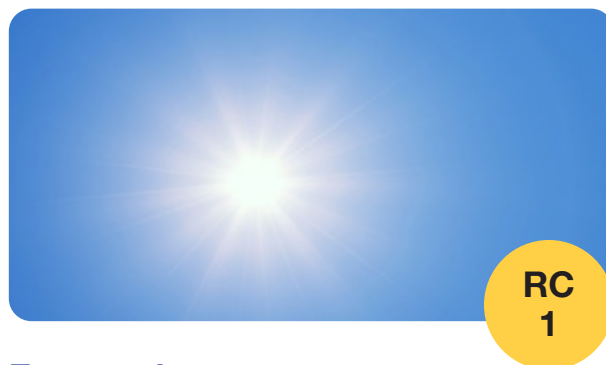
The identified city level vulnerability and exposure factors have been listed for each risk. City services and functions where the risk particularly needs to be taken into consideration in the planning of operations and adaptation measures have also been included.

The cards also contain the main City of Turku's action plans and policies where the risk must be taken into consideration.

The sectors assessed as the most vulnerable have been indicated with the symbols presented below. The division into sectors is in keeping with the reporting requirements of the Covenant of Mayors.

The risk cards are continuously maintained and updated.

Vulnerable sector	Symbol
Buildings	
Transport	
Energy	
Water	
Waste	
Land use planning	
Agriculture and forestry	
Environment and biodiversity	
Health	
Rescue services	
Tourism	
Education	
Information and communication connections	



Extreme heat

Due to climate change, heatwaves will become more common and more intense. Warmer summers cause an increased need to cool buildings.

Effects:

- harm to health and discomfort caused by heat
- effects on access to household water and on water services, especially in non-built-up areas
- decrease in work efficiency
- increased need to cool buildings
- increased need for home care in elderly care (possibilities to cool apartments vary)
- effects on nature
- effects on the state of the Baltic Sea

Vulnerability and exposure factors:

- ageing of the population (the elderly are more susceptible to the adverse effects of heat)
- health status (people with underlying diseases and long-term illnesses are more susceptible to the adverse effects of heat)
- number of indoor spaces without air conditioning
- urban heat island phenomenon (urban areas are hotter than the surrounding areas)

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (urban planning, building control and health monitoring), urban construction and facilities (facility services), Turku City Group subsidiaries (housing and property companies, energy and infrastructure, water supply companies), business and economic development (events)

City of Turku action plans and policies where the risk must be taken into consideration:

- taking the green structure into consideration in urban planning, forest plan, urban tree policies, building code (including green factor), preparedness plans, workplace surveys.





RC
2

Drought and scarcity of water

Climate change will cause increased, worsening and prolonged dry periods, with Southwest Finland being a particularly risky area in terms of drought. This may reduce the amount of groundwater in the summer. During summers, drought may lead to a water shortage, causing problems particularly to small water reserves and it may have a negative impact on water supply, waterborne transport, energy production, agriculture, food security and industry.

Effects:

- increased need for irrigation
- yield losses in agricultural production and impacts on food security
- increased risk of wildfires and forest fires, harm caused by smoke from fires, damage to property
- challenges with sufficiency and quality of household water and irrigation water
- effects on nature
- adverse impacts of road dust
- effects of drying of clay soil on the built environment and stormwater
- increased acidification in sulphate soils

Vulnerability and exposure factors:

- drought resistance of plant species (e.g. rock meadows typical of Turku)
- prevalence of clay soil

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (urban planning and land property, environmental protection), urban construction and facilities (infrastructure services), Turku City Group subsidiaries (water supply companies)

City of Turku action plans and policies where the risk must be taken into consideration:

- development plan for water services, stormwater programme, biodiversity programme, forest plan, urban tree policies, building code (incl. green factor)



RC
3

Forest fires and wildfires

The risk of forest fires is expected to grow in the future as period of drought increase due to climate change. In vast forest fires, significant amounts of carbon stored in vegetation are released into the atmosphere, accelerating climate change. Forest fires cause local deterioration in air quality and emit black carbon, also known as soot, into the atmosphere. Black carbon has a warming effect on the climate.

Effects:

- forest damage caused by fires
- effects on nature
- damage to buildings, property and people
- potentially significant costs caused by firefighting
- harm caused by smoke, temporary deterioration in air quality (causing discomfort especially to those with respiratory illnesses)

Vulnerability and exposure factors:

- ignoring fire bans issued in connection with forest fire warnings
- sufficiency of rescue services capacity

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (urban planning and land property, environmental protection), urban construction and facilities (infrastructure services), business and economic development (tourism), children and young people

City of Turku action plans and policies where the risk must be taken into consideration:

- forest plan, safety plan, preparedness plans





Freezing-melting cycle

During the winter season, as the temperature varies above and below zero, the cyclic freezing-melting phenomenon causes increased slipperiness and affects maintenance of community infrastructure. It is estimated that such circumstances will first increase with global warming but will later decrease as winters become shorter.

Effects:

- an increase and later a decrease in the need for slipperiness prevention
- impacts of slipperiness prevention on nature
- increased road dust
- risks of slipping accidents
- deterioration of structures and road network and increased need for maintenance (wells, road network, stormwater network)

Vulnerability and exposure factors:

- extent of the road and property network requiring maintenance
- dependency on well water

City of Turku services and functions where particular attention must be paid to the risk:

- urban construction (infrastructure and facility services), urban environment (mobility services), sports services

City of Turku action plans and policies where the risk must be taken into consideration:

- maintenance of road areas and green areas as part of regional maintenance contracts, stormwater programme, building code and construction policies



Rainstorms

The intensity of rainstorms in Southwest Finland will increase during all seasons. Annual precipitation is expected to increase by 9% by 2050 and by 27% by the end of the century. At the same time, the frequency of heavy rainfall will increase by 36% by 2050 and by as much as 58% by the end of the century. The number of precipitation days will increase particularly during the winter period.

Effects:

- Flood risks and damage (such as water damage in buildings, damage to community infrastructure)
- river erosion and collapses of river dikes
- nutrient loading and eutrophication of the Archipelago Sea and water bodies
- peaks in pollutants
- increased need for dredging

Vulnerability and exposure factors:

- condensing urban structure
- extensive surfaces that are impermeable to water in built-up areas
- clay soil that slows absorption of water
- capacity of stormwater system

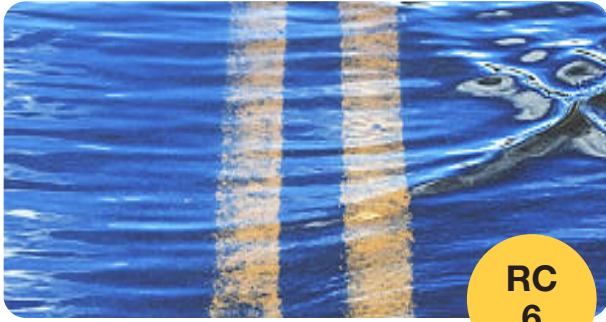
City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (urban planning, building control and health monitoring, environmental protection), urban construction and facilities (infrastructure services and facility services), Turku City Group subsidiaries (water supply companies, energy and infrastructure)

City of Turku action plans and policies where the risk must be taken into consideration:

- stormwater programme, development plan for water services, flood risk management plan, taking the green structure into consideration in urban planning, building code (including green factor), preparedness plans





RC
6

Floods and rising sea level

As a result of intensifying rainstorms, stormwater risks in particular will increase. The risk of sea floods, especially resulting from winter storms, is also significant in the coastal area of Turku. The likelihood of high sea levels is not estimated to rise significantly in the Archipelago Sea by year 2050, but it will rise towards the end of the century. Floods occur occasionally even in the current climate, which emphasises the importance of preparing for flood risks. The current building elevation makes the effects of sea floods possible on the coast.

Effects:

- damage caused by floods to buildings, infrastructure, property and people
- effects on transport, energy, waste management and water supply networks and telecommunications
- effects on the ecosystem
- effects on agriculture

Vulnerability and exposure factors:

- the geographical location of Turku on the coast
- city planning and construction in areas identified as flood risk areas (in the master plan, these are areas of industry and central operations located in sea flood areas in the south-west (including Linna Niemi) and a residential area in Pihlajaniemi)
- extensive surfaces that are impermeable to water in built-up areas
- insufficient dimensioning of flood management measures

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (urban planning and land property, building control and health monitoring), urban construction and facilities (infrastructure services and facility services), Turku City Group subsidiaries (water supply companies, energy and infrastructure (including the port))

City of Turku action plans and policies where the risk must be taken into consideration:

- master plans and local detailed plans, stormwater programme, the Baltic Sea Challenge action plan, flood risk management plan (regional), building code (including green factor), preparedness plans



RC
7

Storms

In light of current information, significant changes in the number and intensity of storms are not likely, but their impacts will increase as ground frost decreases. Average storm intensities will remain approximately the same, while wind speed will increase during winter and spring. Risks are caused by sea water floods resulting from winter storms and by stormwater floods resulting from thunderstorms.

Effects:

- damage caused by storms to buildings, community infrastructure, property and people
- disruptions in distribution of electricity, causing impacts to heating, water distribution, telecommunications and other functions of society
- harm to transport and transport infrastructure
- effects on nature (deforestation)

Vulnerability and exposure factors:

- level of underground cabling of the electricity network, self-sufficiency
- insufficient preparedness on an individual level, limited ability to make an impact
- lack of emergency power generators

City of Turku services and functions where particular attention must be paid to the risk:

- urban construction and facilities (infrastructure services and facility services), urban environment (mobility services), business and economic development (tourism, events), Turku City Group subsidiaries (energy and infrastructure (including the port)), water supply companies, housing and property companies

City of Turku action plans and policies where the risk must be taken into consideration:

- safety plan, flood risk management plan (regional), stormwater programme, development plan for water services, forest plan, urban tree policies, preparedness plans





Soil degradation and compression

Alternating periods of drought and rainfall may weaken the structure and hydraulic conductivity of the ground, increasing the risk of surface runoff and erosion during storms. Clay shrink-swell (CSS) causes the volume of the soil to repeatedly expand and contract as the weather conditions change. Increased rainfall may cause landslides and subsidence.

Effects:

- river erosion and collapses of river dikes
- deterioration in the load-bearing capacity of the ground caused by compression and compaction of the soil
- damage to building structures and damage to roads, transport routes, pipelines and cables, increased need for repairs and maintenance
- deterioration of soil fertility as a result of decreased ground frost and snow cover, nutrient leaching
- A decrease in groundwater level may increase soil acidification and corrosion

Vulnerability and exposure factors:

- soil, topography and location: clay soils, sloping terrain, river valleys, low-lying fields, coastal areas, groundwater areas
- agriculture and arable farming
- built environment, residential building stock

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (urban planning and land property, regional public transport), urban construction and facilities (infrastructure services and facility services), Turku City Group subsidiaries (housing and real estate companies, energy, water supply and infrastructure companies)

City of Turku action plans and policies where the risk must be taken into consideration:

- safety plan, flood risk management plan (regional), stormwater programme, development plan for water services, preparedness plans, building code



Changes in ecosystems

Changes in temperatures and precipitation and increased frequency of extreme weather events will have many different effects on ecosystems and cause changes in the set of species.

Effects:

- changes in the set of species and decreased biodiversity
- spreading of harmful non-native species
- increased harm caused by plant diseases and pest insects (e.g. Dutch elm disease)
- impacts on agriculture and forestry

Vulnerability and exposure factors:

- fragmentation of green areas
- insufficiency of ecological corridors
- condensing urban structure
- the sensitivity and unique biotopes of the coastal and archipelago nature

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (urban planning and land property, environmental protection and health monitoring), urban construction and facilities (infrastructure services)

City of Turku action plans and policies where the risk must be taken into consideration:

- taking the green structure into consideration in city planning, urban tree policies, biodiversity programme, forest plan, building code (including green factor)





Biological hazards

Many disease risks are connected to the weather and human actions. For instance, diseases spread by ticks will become more common due to global warming and as the growth season becomes extended.

Effects:

- increased risk of waterborne diseases as rainstorms become more common (household water) and during heatwaves (bathing water)
- spreading of new plant diseases and pest insects
- tick-borne illnesses becoming more common

Vulnerability and exposure factors:

- number of people in high-risk groups
- sufficiency of health care capacity

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment (environmental protection, environmental health), urban construction and facilities (infrastructure services)

City of Turku action plans and policies where the risk must be taken into consideration:

- biodiversity programme, forest plan, urban tree policies, preparedness plans, environmental health monitoring plan



Spillover effects

Spillover effects refer to interaction chains of weather and climate variability and climate change that begin outside Finnish borders but ultimately extend to Finland. These effects may be diverse.

Effects:

- challenges in availability of raw material or imported energy
- weakened security of supply
- uncontrolled migration (climate refugees) and segregation
- effects on health
- effects on tourism
- factors affecting air quality (air transport)

Vulnerability and exposure factors:

- sufficiency of financial resources in society
- level of stability in society

City of Turku services and functions where particular attention must be paid to the risk:

- urban environment, urban construction and facilities, children and young people, culture, sports, business and economic development, central administration, Turku City Group subsidiaries

City of Turku action plans and policies where the risk must be taken into consideration:

- safety plan, preparedness plans, strategies



ANNEX 7.

Source data for the Risk and Vulnerability Assessment

Local, regional, and national assessments used to update the Risk and Vulnerability Assessment in Turku.

Year	Title	Scope
2025	Cooling is a cost-efficient way to adapt to heatwaves even in high-latitude cities	National
2025	Economic viability of urban greening as a climate change adaptation measure in cool-climate cities	International
2025	Sateisuuden havaittuja ja ennakoituja muutoksia Suomen maakunnissa	National
2025	Tulevaisuusselonteon 1.osa: Strateginen toimintaympäristöanalyysi sekä skenaarioita vuoteen 2045	National
2025	Turun seudun maaperään kohdistuvat ilmastonmuutosvaikutukset	Regional
2025	Maatalouden kuivuudesta ja rankkasateista tehtyjen ilmastoriskiarvioiden tuloksia	Regional
2023	Ilmastonmuutokseen liittyvät alueelliset ominaispiirteet ja haavoittuvuudet Suomessa	National
2022	Kansallinen ilmastonmuutokseen sopeutumissuunnitelma 2030	National
2022	Ilmastonmuutokseen sopeutuminen Suomessa – nykytila ja kehitysnäkymät	National
2021	Helteen terveyshaitat ja niiden ehkäisy Suomessa	National
2021	Turun rannikkoalueen tulvariskien hallintasuunnitelma vuosille 2022-2027	Local
2021	Varsinais-Suomen ilmastotiekartta 2030	Regional

ANNEX 8. Description of emission calculation methods

Calculation Methods

The City of Turku's greenhouse gas emissions are monitored using the ALas model, developed and maintained by the Finnish Environment Institute (Syke). The ALas model is a greenhouse gas emissions calculation service for municipalities and regions, and it covers all municipalities in Finland.

The greenhouse gas emission results according to the ALas model are presented in the Climate Plan chapter Development of emissions 1990–2025 (Diagram 1). The calculation method and results are described in more detail on the emissions service website at: <https://paastot.hiilineutraalisuomi.fi/>

The development of greenhouse gas emissions is also monitored using the SECAP calculation method under the Covenant of Mayors. Emissions have been calculated using the SECAP method for the years 1990, 2015, 2020 and 2025. The results of the 2025 SECAP calculation are presented in the Climate Plan's Diagram 2 and time series in Diagram 3.

The SECAP calculation builds on the ALas model, the results of which have been adjusted and refined as required by the SECAP guidance. The main differences between the ALas model and the SECAP calculation model lie in the sector breakdown and in the emission factor for electricity. The ALas model uses national emission factors for electricity, broken down into electricity for heating and electricity for other consumption. The SECAP model takes more detailed account of electricity production located within the

City of Turku's geographical area and of electricity production owned by the Turku Group.

In the SECAP calculation, more detailed data has been used for wastewater treatment and fuels used by industry than in the ALas model.

SECAP Method

The SECAP calculation includes all the greenhouse gases contained in the ALas calculation system: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and F-gases. F-gases were included for the first time in the 2026 update of the Climate Plan, so that the calculation matches the coverage of national municipal-level emissions monitoring. Greenhouse gases are reported as carbon dioxide equivalents (CO₂-eq). Carbon dioxide equivalents are calculated using the IPCC's 2007 Global Warming Potential values (GWP). The warming potential of methane is 28 and that of nitrous oxide is 265.

The SECAP calculation covers the same emission sources as the ALas calculation. In accordance with the SECAP sector breakdown, the calculation includes energy-related emissions from buildings, equipment and facilities owned by the city, tertiary buildings, equipment and facilities, residential buildings, industry, agricultural buildings, road transport, rail transport, machinery, and water transport. In addition, emissions from waste management and agriculture, as well as F-gas emissions, are included. The sectors included are presented in more detail in Table 1.1.

Table 1.1. Sectors and data sources included in the SECAP calculation.

Buildings, equipment, facilities and industries		
Sector	Definition	Data Source
Municipal buildings, equipment and facilities	Buildings owned and operated by the city (excluding residential buildings), street lighting	City of Turku
Tertiary (non-municipal) buildings, equipment and facilities	Service buildings not owned by the city	ALas model
Residential buildings	All residential buildings located in the city	ALas model
Industry (not covered by emissions trading)	Industry not covered by emissions trading, emissions from industrial buildings and fuel use	Industrial facilities
Agriculture (energy-related)	Agricultural buildings	ALas model

Transport		
Sector	Definition	Data Source
Municipal fleet	Vehicles owned by the City of Turku	City of Turku
Public transport	Public transport buses (services operated by Föli and Turun kaupunkiliikenne Oy within the city area)	City of Turku
Private and commercial transport	Vehicles registered in the City of Turku area, excluding the municipal fleet and public transport buses	ALas model
Rail transport	Passenger and freight rail transport within the city area	ALas model
Machinery	Emissions from machinery within the city area	ALas model
Water transport	Water transport within the city area	ALas model

Other		
Sector	Definition	Data Source
F-gases	Refrigeration equipment in retail stores and professional kitchens, building air conditioning, vehicle air conditioning and other sources.	ALas model
Agriculture	Livestock enteric fermentation, manure management and agricultural soils; inorganic fertilisers, organic fertilisers, soil, other	ALas model
Waste management	Landfills, wastewater treatment, composting and anaerobic digestion	- Waste treatment; ALas model - Wastewater treatment; YLVA system - Municipal shares; Turun seudun puhdistamo Oy

Energy used in buildings has been divided into electricity and district heating, as well as wood, oil and other fuels used in building-specific heating. District cooling has not been accounted for separately in the calculation, because the energy it consumes is not reported separately in energy consumption reporting. The energy consumption and emissions of district cooling production are included in the emissions of district heating and electricity consumption.

The energy consumption of industry not covered by emissions trading has been divided into the electricity, district heating and fuel use.

Road transport fuels have been divided into gasoline and diesel, and the biofuel share they contain. The electricity consumption of road transport, and the associated emissions, are included in the emissions from electricity consumption in buildings. Public transport fuels also include electricity.

The fuels of machinery and water transport have been divided into diesel and gasoline, and the fuels of rail transport into diesel and electricity.

Emission Factors of the SECAP Method

The SECAP calculation is a consumption-based calculation method and is based on energy consumption within the City of Turku area. In the calculation method, emission factors are defined per unit of energy consumed.

The emission factor for district heating is calculated as the emissions from the production of district heating supplied by Turku Energia within the City of Turku, divided by the amount of district heating consumed. The emissions of combined heat and power production are allocated between electricity and heat using the benefit-sharing method.

In accordance with the SECAP calculation guidance, the electricity emission factor takes into account the electricity production and associated emissions of Turku Energia and other operators owned by the City of Turku. According to the SECAP guidance, the calculation also takes into account electricity consumption covered by guarantees of origin within the city area.

Purchases and sales of guarantee-of-origin certified electricity across the city's borders have not been taken into account in the calculation, owing to uncertainties in the underlying data. No data are available on the amount of guarantee-of-origin certified electricity supplied to the Turku area by electricity producers other than Turku Energia, and the amount of certified electricity sold annually by Turku Energia outside Turku also involves uncertainties.

The annual emission factor for electricity has been calculated in accordance with the SECAP guidance as follows:

$$LEEF_{EL} = \frac{(TCE - \Sigma LE - \Sigma CE) \times EF_{EL} + \Sigma GHG_{LE} + \Sigma GHG_{CE}}{TCE}$$

$LEEF_{EL}$ = Local emission factor for electricity

TCE = Total electricity consumption

ΣLE = Local electricity production

ΣCE = use of guarantee-of-origin certified electricity

EF_{EL} = National emission factor for electricity

ΣGHG_{LE} = Greenhouse gas emissions of local electricity production

ΣGHG_{CE} = Greenhouse gas emissions of the guarantee-of-origin certified electricity consumed

Table 1.2 presents the emission factors (t CO₂-ekv./MWh) used in the SECAP calculation for the years 1990, 2015, 2020 and 2025

Year	Electricity	District heating	Fossil fuels						Renewable fuels		
	Local		LPG	Heating oil	Diesel	Gasoline	Coal	Other fossil	Biogas	Biofuel	Other biomass
1990	0,223	0,307	0,233	0,266	0,264	0,266	0,334	0,291	-	-	0,007
2015	0,193	0,221	0,233	0,265	0,266	0,265	0,334	0,291	0,0002	0,001	0,007
2020	0,093	0,071	0,234	0,265	0,264	0,265	0,334	0,289	0,0002	0,001	0,007
2025	0,022	0,016	0,234	0,264	0,265	0,255	-	0,289	0,0002	0,001	0,007

Energy Balance

A summary of the City of Turku's energy consumption for the years 1990, 2015, 2020 and 2025 is presented in Table 1.3. The 2025 energy balance according to the SECAP calculation is presented in Table 1.4, in the format used for reporting to the EU.

Table 1.3. Energy balance (MWh) for Turku calculated using the SECAP method, 1990, 2015, 2020 and 2025

Year	Energy Consumption (MWh)
1990	5 301 428
2015	4 544 826
2020	4 286 092
2025	4 019 695

Table 1.4. Turku's energy balance (MWh) calculated using the SECAP method in 2025

FINAL ENERGY CONSUMPTION [MWh]																	
Sector		Fossil fuels									Renewable energies						Total
		Electricity	District heating and cooling	Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Biogas	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES																	
Municipal buildings, equipment/facilities		64690	108022			118											172830
	Municipal buildings, equipment/facilities	55778	108022			118											163918
	Public lighting	8912															8912
	Other																
Tertiary (non municipal) buildings, equipment/facilities		693664	277148			67002					24525				3439		1065778
	Institutional buildings	693664	277148			67002					24525				3439		1065778
	Other														0		
Residential buildings		619444	744079			10656					524				60577		1435280
Industry	Non-ETS	247640	89608		6530						4713	10594			26731		385815
	ETS (not recommended)																
Buildings, equipment/facilities and industries not allocated																	
Subtotal		1625439	1218857		6530	77775					29761	10594			90747		3059703
TRANSPORT																	
Municipal fleet							1153	72						214			1439
	Road						1153	72						214			1439
	Other																0
Public transport		15683					11580							11122			38386
	Road	3404					11517							11122			26044
	Rail	12279					63							0			12342
	Local and domestic waterways													0			0
	Other													0			0
Private and commercial transport		590					328993	368383						94652			792618
	Road						299631	352975						94652			747258
	Rail	590					861							0			1451
	Local and domestic waterways						20348	15408						0			35756
	Local aviation													0			0
	Other						8153							0			8153
							107530	2715						0			110245
Subtotal		16273					449257	371169						105988			942688
OTHER																	
Agriculture, Forestry, Fisheries		4255	6685			484					3560				2320		17304
Other not allocated																	0
Subtotal		4255	6685			484					3560				2320		17304
TOTAL		1645967	1225542		6530	78259	449257	371169			33321	10594		105988	93067		4019695

ANNEX 9.

Methodology for assessing the impacts of investments on the regional economy

Santtu Karhinen
Finnish Environment Institute
santtu.karhinen@syke.fi, +358 50 465 8306

Assessment of the regional economic impacts of emission-reduction measures

In an economy, businesses, industries, households and the public sector are in constant interaction with one another. Businesses produce goods and services, but their production also requires intermediate inputs, services, energy, transport, labor and capital supplied by other businesses. Consequently, an increase in demand in one industry does not affect only that industry but is transmitted through production chains to other industries as well. For example, investment in construction directly increases activity in the construction sector, while at the same time increasing demand for construction materials, design services, transport, machinery and equipment services, and other inputs required to implement the project.

Input-output models are used to assess how changes in demand affecting different industries are transmitted throughout the economy via inter-industry production and supply chains. The models can be used, for example, to examine the effects of investment, consumption, exports or public procurement on production, value added, employment and tax revenues. The key point is that the economic impact is not limited to the industry in which the initial change in demand occurs, as the effects are also transmitted to other industries through demand for intermediate inputs, services and labor.

This approach can also be applied to impact assessments of the green transition and climate action. In this case, the analysis examines the regional economic impacts of investments and measures associated with reducing emissions on the economy of the region under consideration.

Definitions and concepts used in the assessment of regional economic impacts

Regional economic assessments focus particularly on impacts on regional production, value added, employment, and municipal and corporate income tax revenues. A key consideration in assessing regional economic impacts is the geographical sourcing of investment goods. The larger the share of project implementation, labor and subcontracting that is provided by businesses and workers within the region under consideration, the larger the economic impacts remain within the region. Conversely, purchases from outside the region and imported input reduce local impacts.

- i. Direct impacts arise directly in the businesses from which other businesses purchase the intermediate input required for their own production activities. If goods are sourced from outside the region, the associated economic impacts leak out of the region. In larger regions with more diversified industrial structures, a greater share of demand can generally be met through regional production, resulting in smaller leakages from direct purchases.
- ii. Indirect multiplier effects describe the production-chain effects triggered by the initial increase in demand. When direct demand for a particular industry increase, that industry requires goods and services from other industries for its production. This generates a backward-propagating supply chain through the production system, with effects gradually diminishing along the chain. The magnitude of indirect impacts depends on the size of the region, the diversity of its industrial structure, and the linkages between businesses. The larger the share of required inputs that can be sourced within the region, the larger the multiplier effects retained within the region.
- iii. Induced income effects describe the increase in consumer demand that arises when wage income generated through the direct and indirect employment effects of an investment is partly spent on household consumption. Of this consumption, only part is directed towards goods and services produced within the region under consideration, while part is directed elsewhere in Finland or abroad. Regionally induced income effects arise to the extent that this consumption increases demand for goods and services produced within the region.

The indicators used in the impact assessment include impacts on the value of production taking place in the region, value added, employment, and the municipal and corporate income tax revenues generated through these effects.

- i. Production / output refers in this assessment to the value of the total output of industries. In general terms, it can be regarded as a measure like turnover, describing the total value of goods and services produced by an industry. Production includes both the new value generated in production and the value of intermediate goods and services used in production. The production impact therefore describes the total demand generated by an investment throughout production chains, but it should not be interpreted directly as new income or value added generated within the region. Value added provides a better measure of new economic value.
- ii. Value added describes the new economic value generated in production. At the level of the national economy, gross domestic product consists of the added value generated by different industries, meaning that value added can be considered an indicator of the impact on GDP. It consists mainly of wages, employers' social contributions, operating surplus of businesses, and taxes on production less subsidies. In regional economic analysis, value added is often a more important indicator than production because it provides a better measure of how much new economic value an investment generates within the region.
- iii. Employment impacts are expressed in person-years. A person-year refers to the full-time labor input of one person over one year. For example, ten person-years may mean ten people working for one year or five people working for two years. A person-year therefore does not necessarily represent a permanent new job, but rather the labor input associated with the implementation of an investment and its production chains.
- iv. Tax impacts cover municipal income tax and corporate income tax revenues. The municipal income tax impact arises from wage income generated by investments and depends, among other things, on the magnitude of employment effects, wage levels, employees' places of residence, and the structure of municipal taxation. The corporate income tax impact, in turn, relates to corporate income tax generated by profitable business activity and the share of this revenue allocated to municipalities. Estimating corporate income tax impacts is more uncertain than estimating municipal income tax impacts because companies' taxable income depends, for example, on profitability, depreciation, financing costs and corporate structures.

Assessment of the regional economic impacts of measures implemented in Turku

The assessment of the regional economic impacts of investments that have reduced greenhouse gas emissions in the Turku region is based on the environmentally extended ENVIMAT input-output model of the Finnish Environment Institute. The model has previously been used, for example, to assess the economic impacts of green transition investments (Karhinen ym. 2023¹ and Kuusi ym. 2020²), the material flows of the Finnish economy and the impacts of circular economy measures (Heikkinen ym. 2026³ ja Savolainen ym. 2024⁴) as well as the impacts of national energy and climate policy measures and scenarios (Koljonen ym. 2025⁵).

In the calculations, purchases of goods associated with the investments under consideration are allocated to ENVIMAT product groups based on their content. The model is then used to estimate how demand for these goods is divided between production within the region, products and services sourced from elsewhere in Finland, and imports from abroad. The assessment assumes that supply follows the average regional supply and import structures of the industries supplying the relevant goods.

¹Karhinen ym. (2023). Alueellisten talous- ja ympäristövaikutusten arviointi maakuntien ENVIMAT-malleilla. Suomen ympäristökeskuksen raportteja 20/2023. <https://helda.helsinki.fi/items/a364560c-fae2-454a-841d-90e111b6803d>

²Kuusi ym. (2021). Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja 2021:22. <https://tietokayttoon.fi/julkaisut/raportti?pu-bid=URN:ISBN:978-952-383-233-6>

³Heikkinen ym. (2026). Will circular economy actions deliver what is promised? A comparative analysis using static and dynamic environmentally extended input-output simulation models. Ecological Economics 247, 109042. <https://doi.org/10.1016/j.ecolecon.2026.109042>

⁴Savolainen ym. (2024). Suomen kansantalouden materiaaivirrat ja niiden vaikutukset: Toteutunut kehitys ja kiertotalouden skenaariot vuodelle 2035. Valtioneuvoston julkaisuja 2024:8. <https://julkaisut.valtioneuvosto.fi/items/f289d3e8-c0f9-47d8-a2f8-ce3f9e4509b5>

⁵Koljonen ym. (2025). Kansallisen energia- ja ilmastopolitiikan uudet toimet ja skenaariot – keskipitkän aikavälin vaikutusarviot. VTT Technology 442. <https://cris.vtt.fi/en/publications/kansallisen-energia-ja-ilmastopolitiikan-uudet-toimet-ja-skenaari/>

The base year of the ENVIMAT model used in the assessment is 2019. Consequently, the values of investments implemented in different years were converted into 2019 prices before the model calculations. This allows investments undertaken at different points in time to be assessed consistently using the model's price level.

In assessing induced income effects, taxes, tax-like charges and the share of income allocated to savings are first deducted from wage income. Of the remaining disposable income used for consumption, the share directed towards goods and services produced within the region under consideration is then estimated. The sectoral distribution of consumption is assumed to correspond to the average consumption structure of households in the region.

Corporate income tax impacts are estimated using industry-specific average operating-surplus shares of production value. The amount of corporate income tax is estimated based on operating surplus, and municipalities receive a share corresponding to the annually determined allocation of corporate income tax revenues. Municipal income tax impacts, in turn, are estimated using the direct and indirect employment effects generated in each industry, average industry-specific wage levels, and Turku's annually determined municipal income tax rates.

The assessment examined four groups of measures linked to emission reductions for which input data were obtained from the City of Turku, Turku Energia and Turun Seudun Energiantuotanto:

- District heating production investments implemented since 2009 in the Oriketo bioheat plant, the Kakola heat pumps, the Luolavuori pellet plant, the Artukainen steam production plant and flue-gas scrubber, and the Naantali power plant. The investment distribution of the energy sector in the national accounts was used to allocate investment goods to product groups.
- The replacement of oil heating with heat pumps and district heating between 2010 and 2023 was estimated based on changes in the stock of oil-heated buildings. Costs associated with equipment purchases, installation work and drilling of ground-source heat pump boreholes were determined in the assessment. Of these, installation work and borehole-drilling services can be sourced within the region.
- The investment associated with the trunk bus line reform includes information received from the City of Turku on construction and design work.
- Planned investments in walking and cycling infrastructure for 2025–2028 are based on the City of Turku's investment programme.

Based on the results, the largest regional economic impacts are associated with investments in district heating production. Investments of EUR 259.5 million in district heating are estimated to have generated approximately EUR 498.5 million in turnover, EUR 201.9 million in value added, and approximately 1,925 person-years of employment. In addition, the impacts are estimated to have increased municipal and corporate income tax revenues by approximately EUR 8.65 million.

Table 1. Regional economic impacts generated by the investments, excluding impacts during the operational phase.

	Investment in the region (EUR million)	Revenue (EUR million)	Value added (EUR million)	Employment (person-years)	Municipal and corporate income taxes (EUR million)
District heating	259,5	498,5	201,9	1924,6	8,65
Replacement of oil heating	30,7	56,9	23,9	242,7	0,82
Bus lines	8,5	16,7	6,5	51,5	0,19
Walking and cycling routes	7,8	15,5	5,9	46,8	0,17

The replacement of oil heating with heat pumps and district heating represents a clearly smaller but nevertheless regionally significant investment package. Investments of approximately EUR 30.7 million are estimated to have generated EUR 56.9 million in turnover, EUR 23.9 million in value added and approximately 243 person-years of employment. The associated tax impacts were estimated at approximately EUR 0.82 million.

Among measures related to the transport system, the EUR 8.5 million investment in the trunk bus line reform was estimated to have generated EUR 16.7 million in turnover, EUR 6.5 million in value added, and approximately 52 person-years of employment. The municipal and corporate income tax impacts amounted to approximately EUR 0.19 million. The impacts of the planned investments in walking and cycling infrastructure are of a similar magnitude: investments of EUR 7.8 million are estimated to generate EUR 15.5 million in turnover, EUR 5.9 million in value added, approximately 47 person-years of employment, and EUR 0.17 million in municipal and corporate income tax revenues.

Overall, the results indicate that green transition investments can have substantial positive regional economic impacts. Investments associated with the transformation of energy production can generate significant production, value added and employment within the region. At the same time, smaller investments, such as replacing oil heating, developing public transport, and investing in walking and cycling infrastructure, can support local businesses and strengthen regional economic dynamics.

A key strength of the method is that it makes visible the broader regional economic linkages associated with investments in climate action. However, the results should be interpreted as model-based estimates under the selected assumptions. The input-output model describes the economic multiplier effects of investments based on existing economic structures and, as such, does not account for all possible dynamic effects, such as long-term productivity impacts, behavioral changes, the opportunity costs of financing investments, or market capacity constraints.

In summary, the key message of the assessment is that the regional economic significance of climate action depends strongly on how successfully investments can be linked to local businesses, expertise, labor and value chains.

ANNEX 10. Energy and transport poverty

Santtu Karhinen
Finnish Environment Institute
santtu.karhinen@syke.fi, +358 50 465 8306

Assessment of the current state of energy and transport poverty

Indicators of residential energy poverty

Energy poverty was modelled at the household level using the Household Budget Survey (HBS) collected by Statistics Finland. The assessment is based on a national-level analysis conducted using the dataset (Numminen ym., 2026)¹. Two indicators commonly referred to in the research literature as the “10% threshold” and LIHC were applied.

The 10% threshold indicator defines a household as energy poor if its residential energy costs account for at least 10% of equivalised disposable monetary income, adjusted for household size. The indicator is widely used, but its main limitation is that it may also classify high-income households as energy poor and therefore does not always accurately capture the underlying problem of energy poverty.

The second indicator is LIHC (Low Income High Cost), which classifies a household as energy poor only when it simultaneously meets two conditions:

1. The household's required energy costs are high relative to the population. An energy cost is assigned to the household based on its energy consumption and housing conditions, representing the energy required to maintain a standard indoor temperature and meet basic residential energy needs. The household meets the High Cost condition if its energy costs exceed the median for the population as a whole.
2. The household has exceptionally little disposable income remaining after energy costs. The income measure used in the assessment is equivalized household disposable income, adjusted for household size, from which energy costs are deducted. The remaining income is compared with the low-income threshold, defined as 60% of the population median income. The household meets the Low Income condition if its remaining income after residential energy costs falls below the low-income threshold.

The LIHC indicator combines ability to pay and energy needs, thereby reducing the risk of classifying households with both high energy consumption and high incomes as energy poor. At the same time, it identifies households whose housing conditions lead to sufficiently high energy needs that their incomes are inadequate to maintain reasonable heating conditions. For this reason, its use is generally preferable to the traditional 10% threshold.

The calculation of the LIHC indicator also involves challenges. It is sensitive to how energy costs are defined, including assumptions concerning normative energy consumption, energy prices and indoor temperatures, as well as to whether other housing costs are included alongside energy costs. International research literature commonly considers total housing costs, but methodological choices vary between studies and may affect both indicator levels and comparability. In an urban context, a more easily monitored version includes only energy costs.

Method for assessing energy poverty

The assessment is based on the regression modelling framework presented in Numminen et al. (2026). The dependent variable Y_i is a binary indicator (1 = energy poor, 0 = not energy poor), defined according to the energy-poverty measure applied in the analysis. The models were estimated using the sampling weights of the Household Budget Survey so that the results are as representative of the total population as possible.

¹Numminen, S., Karhinen, S. & Ferreira, E. (2026). Crouching energy poverty, hidden heating costs: Applying energy poverty measurement in a Nordic country. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=6429611

The probability of household energy poverty was modelled using logistic regression, in which the linear index η_i is defined using the explanatory variables:

$$\Pr(Y_i = 1 | X_i) = \frac{1}{1 + \exp(-\eta_i)}, \quad \eta_i = \beta_0 + X_i\beta. \quad (1)$$

The explanatory variables included characteristics of the building and dwelling stock, as well as variables describing housing conditions and the nature of the area. The main categorical factors are (i) area type, (ii) heating method, and (iii) building type. The model also includes continuous variables such as year of construction and floor area, as well as a variable indicating owner-occupation. For categorical variables, one category serves as the reference category, and the other categories are interpreted relative to this reference category on the log-odds scale. The estimated model can be used to calculate the predicted energy-poverty risk for any household profile directly through the logistic transformation.

The Household Budget Survey does not cover all municipalities sufficiently for municipality-specific model estimation or municipality-level predictions directly based on microdata. Municipality-level estimates were therefore produced by regionalizing the estimated regression results using municipality-specific structural data. Municipality-level input variables were constructed as follows:

- For dummy variables, municipality-specific shares were used, such as the shares of heating systems, area types, building types and owner-occupied dwellings.
- For continuous variables, municipality-specific averages were used, such as the average year of construction and average floor area.

Because the logistic model is nonlinear, simply inserting the characteristics of an “average household” in a municipality may produce bias when several structurally different household groups coexist within the municipality. Municipality-level predictions were therefore produced by averaging predicted probabilities across the key structural classifications. Let the share of area type a in municipality m be $s_{m,a}$, the share of heating system h be $s_{m,h}$, and the share of building type t be $s_{m,t}$ where:

$$\begin{aligned} a &\in \{\text{inner urban area, outer urban area, rural local centre, core rural area}\} \\ h &\in \{\text{district heating, direct electric heating, oil heating, wood heating, ground source heating}\} \\ t &\in \{\text{apartment building, detached house, row house}\} \end{aligned}$$

At the municipal level, only marginal shares are typically available rather than joint distributions. The joint share of groups was therefore approximated under an independence assumption:

$$s_{m,aht} \approx s_{m,a} s_{m,h} s_{m,t}. \quad (2)$$

First, the municipality-specific baseline index was constructed for variables that were not grouped, such as year of construction, floor area and owner-occupation:

$$\eta_{m,base} = \beta_0 + \beta_1 \overline{\text{Constructionyear}}_m + \beta_2 \overline{\text{Surfacearea}}_m + \beta_3 s_{m,ownership}. \quad (3)$$

A group-specific index was then calculated for each combination $\{a, h, t\}$ by adding the main effects of the categorical classifications:

$$\eta_{m,aht} = \beta_a + \beta_h + \beta_t, \quad p_{m,aht} = \frac{1}{1 + \exp(-\eta_{m,aht})}, \quad (4)$$

The municipality's energy-poverty share was obtained as a weighted average:

$$P_m \approx \sum_a \sum_h \sum_t S_{m,a} S_{m,h} S_{m,t} P_{m,aht} \quad (5)$$

Finally, the expected number of energy-poor households in the municipality is obtained by multiplying the share by the number of households H_m :

$$\hat{N}_m = H_m P_m \quad (6)$$

In principle, this calculation corresponds to predicting probabilities for different household profiles at the household level and averaging them according to the municipality's structural composition. The method takes account of the nonlinearity of the logit model by averaging probabilities across the key structural classifications.

Results

The LIHC indicator shows that, under current conditions, approximately 5.5% of households in Turku, corresponding to around 6,500 households, are classified as energy poor. Using the 10% threshold, approximately 3.7% of households in Turku, or around 4,300 households, are classified as living in energy poverty.

Transport poverty indicators

Transport poverty was modelled at the household level using the Household Budget Survey (HBS) collected by Statistics Finland. In this assessment, transport poverty refers to a situation in which a household's ability to meet everyday mobility needs is constrained by high transport expenditure, limited ability to pay, or a lack of alternative mobility options.

The analyses were based on definitions used in previous research literature. Alonso-Epelde et al. (2023)² present an HBS-based framework for assessing transport poverty that distinguishes between indicators of transport affordability and an indicator that also incorporates the availability of public transport alternatives.

Two indicators were applied: LIHC (Low Income, High Cost) and VTU (Vulnerable Transport User). The LIHC indicator classifies a household as transport poor when it simultaneously meets two conditions:

1. The household's transport expenditure is high relative to the population. Household transport expenditure includes expenditure on private transport and public transport but excludes vehicle acquisition costs. A household meets the High Cost condition if its transport expenditure exceeds the median level for the population under consideration. In such cases, meeting the household's mobility needs require greater-than-usual financial commitment.
2. The household has exceptionally little disposable income remaining after transport expenditure. The income measure used in the assessment is equivalized disposable household income adjusted for household size, from which transport expenditure is deducted. The remaining income is compared with the low-income threshold, defined as 60% of the population median income. The household meets the Low Income condition if its remaining income after transport expenditure falls below this threshold.

The LIHC indicator combines ability to pay with high mobility costs. It therefore reduces the risk of classifying households with both high transport expenditure and high incomes as transport poor. At the same time, it identifies households whose mobility expenditure significantly reduces their financial room for operating and may make essential everyday trips, such as commuting, education, shopping and access to services, more difficult.

There are also challenges associated with calculating the LIHC indicator. It is sensitive to the way transport expenditure is defined, including whether fuel, vehicle purchase and maintenance costs, insurance, taxes, parking and public transport expenditure are included. The results are also affected by whether housing costs are deducted from income in addition to transport expenditure.

²Alonso-Epelde, E., García-Muros, X. & González-Eguino, M. (2023). Transport poverty indicators: A new framework based on the household budget survey. *Energy Policy* 181, 113692. <https://www.sciencedirect.com/science/article/pii/S030142152300277X>

An HBS-based assessment primarily captures observed transport expenditure, which may underestimate transport poverty if households are forced to restrict their mobility because of costs. Low transport expenditure may therefore not necessarily indicate low mobility needs but may instead reflect trips that households are unable to make.

The VTU indicator classifies a household as vulnerable from a transport perspective when it simultaneously meets three conditions:

1. The household's transport expenditure is exceptionally high relative to the population. The first condition is met if the household's transport expenditure share is more than twice the national median. This describes a situation in which the household must devote an exceptionally large share of its resources to meeting mobility needs.
2. The household has a below-average income level. The second condition is met if the household's income is below the median income of all households. This restricts the indicator to households for which high transport costs may pose a genuine affordability risk.
3. The household has limited opportunities to use public transport as an alternative to private car use. In the HBS-based application, this is assessed using public transport expenditure. The condition is met if the household's expenditure on public transport services is below the national median among households that have any public transport expenditure at all. Low public transport expenditure is interpreted as an indirect indication that public transport is not an easily accessible, affordable or temporally realistic alternative for the household.

A strength of the VTU indicator is that it does not assess transport poverty solely based on transport expenditure, but combines high mobility costs, household economic vulnerability, and a lack of alternative mobility options. It is therefore particularly useful for assessing the effects of increases in transport prices, fuel costs or climate policies affecting transport on households.

The indicator helps identify households that are dependent on private cars but have limited capacity to adapt to rising transport costs or shift to lower-emission mobility alternatives.

However, calculation of the VTU indicator also has limitations. Public transport expenditure does not directly measure the availability of public transport but serves as an indirect proxy in Household Budget Survey data. A household may have low public transport expenditure because public transport is genuinely unavailable, but also because mobility needs are limited, trips are made on foot or by bicycle, or public transport is not used for other reasons.

The VTU indicator should therefore be interpreted primarily as a measure of exposure to transport costs and the lack of alternative mobility options, rather than as direct evidence that a household is transport-excluded in every case.

Method for assessing transport poverty

The dependent variable Y_i is a binary indicator (1 = transport poor, 0 = not transport poor), defined according to the transport-poverty measure used in the analysis. The models were estimated by using Household Budget Survey sampling weights to ensure that the results are as representative as possible of the total population. The probability of household transport poverty was modelled using logistic regression, in which the linear index η_i is defined using the explanatory variables:

$$\Pr(Y_i = 1 | X_i) = \frac{1}{1 + \exp(-\eta_i)}, \quad \eta_i = \beta_0 + X_i\beta. \quad (7)$$

The explanatory variables describe the spatial structure, household socioeconomic status, and household composition. Spatial structure was described using dummy variables for area types, including, for example, inner urban areas, outer urban areas, rural local centers, core rural areas and sparsely populated rural areas. Socioeconomic status was described by the shares of students, pensioners, unemployed persons and other population groups included in the model. Household composition was described using the number of adults and the number of children under the age of 17.

For categorical variables, one category serves as the reference category, and the coefficients of the other categories describe differences relative to this reference category on the log-odds scale. The estimated model can be used to calculate the predicted risk of transport poverty for any household profile through the logistic transformation. The Household Budget Survey does not cover all municipalities sufficiently for municipality-specific model estimation or predictions directly based on municipality-level microdata. Municipality-level estimates were therefore produced by applying the estimated regression model to municipality-specific structural data.

Municipality-specific input variables were constructed using municipality-specific shares or averages for the variables included in the model. Municipality-specific shares were used for dummy variables, while municipality-specific averages were used for continuous variables.

The predicted transport-poverty share for municipality m was then obtained using the logistic transformation:

$$P_m = \frac{1}{1 + \exp(-\eta_m)}. \quad (8)$$

Finally, the expected number of transport-poor households, or households vulnerable to transport costs, in the municipality is obtained by multiplying the predicted share by the number of households H_m :

$$\hat{N}_m = H_m P_m. \quad (9)$$

The calculation represents a model-based regionalization approach, in which relationships estimated from household-level Household Budget Survey data are applied to structural data for municipalities. The method produces an estimate of how the probability of transport poverty varies between municipalities based on their spatial structure, population structure and household composition.

A key limitation of the method is that municipality-level calculations are based on aggregated shares and averages. They therefore do not capture the joint occurrence of all risk factors at household level. For example, unemployment, having children and particular area types may be concentrated among the same households in ways that municipality-level averages do not reveal. The results should therefore be interpreted as model-based estimates of the likely spatial variation in transport poverty, given the municipality-level structural information available.

Results

The LIHC indicator shows that, under current conditions, approximately 4.6% of households in Turku, corresponding to around 5,350 households, are classified as transport poor.

Using the VTU indicator, approximately 4.4% of households in Turku, or around 5,100 households, are classified as living in transport poverty.

ANNEX 11. Description of scenario calculations

The achievability of the climate plan's targets was evaluated using scenario calculation. The scenarios describe what the development of Turku's greenhouse gas emissions will be like if the assumed effects of national climate policy and the additional measures decided and planned in Turku are realized as assumed.

The scenario calculation was prepared for emissions according to both the ALas calculation system and the SECAP method. Both calculations used the same scenario assumptions, but the emission boundaries and classification follow the principles of the respective calculation methods. This approach ensures that the results are comparable with both the national municipal emission calculation and the reporting according to the EU Covenant of Mayors for Climate and Energy. The scenario calculation based on the ALas calculation system is described in the methodological description of the greenhouse gas emissions scenario tool for municipalities¹.

The starting point of the calculation was Turku's sector-specific greenhouse gas emissions in 2025. The 2029 emissions were estimated by applying sector-specific change assumptions to these, which are based on the national climate policies and measures and their impact assessments. Key sources were the latest medium-term climate plan², the national energy and climate strategy³, and the impact assessments of the KEITO project⁴.

National assumptions form the baseline development of the scenarios. They describe, for example, the estimated effects of the expansion of emissions trading, biofuel distribution obligations, energy taxation, energy efficiency measures in buildings, the electrification of the vehicle fleet, and regulations concerning refrigerants. These development estimates were applied to Turku's 2025 emission level on a sector-by-sector basis.

In addition to national development, the scenarios took into account the measures of the City of Turku and other actors in the Turku area in sectors where they are estimated to reduce emissions more than the national development. These include, among other things, the decarbonization of Turku Energia's electricity and district heat production, heating system renovations in buildings and the information steering supporting them, the Green Deal measures for non-road machinery, and the promotion of sustainable and low-carbon mobility. Local additional measures were treated as complementary to national development, so that the same emission reductions are not double-counted.

The land use sector was treated separately from the other sectors. In the calculation, it was assumed that the sector's net balance will remain at the 2024 level. The assumption is based on maintaining and striving to strengthen forest carbon sinks, for example, by limiting loggings in city-owned forests and by creating incentives for private forest owners to extend forest rotation periods. However, there is greater uncertainty associated with the development of the land use

¹<https://hiilineutraalisuomi.syke.fi/wp-content/uploads/sites/8/2025/05/ALasSken-1.1-menetelmakuvaus-1.pdf>

²<https://julkaisut.valtioneuvosto.fi/server/api/core/bitstreams/b01ae9d6-55d6-4602-b9bc-e453a746c344/content>

³<https://julkaisut.valtioneuvosto.fi/server/api/core/bitstreams/0ae40a06-d84e-493b-b711-9d24cb6f9060/content>

⁴<https://publications.vtt.fi/pdf/technology/2025/T442.pdf>

ANNEX 12.

Adaptation Scoreboard data

The adaptation status review was conducted using the adaptation scoreboard according to the SECAP reporting model. The scoreboard was used to assess Turku's capability in adapting to climate change. The city's capability was assessed on a scale of A-D, where:

A = Taking the lead (indicative completion level over 75 %)

B = Forging ahead (indicative completion level 50-75 %)

C = Moving forward (indicative completion level 25-50 %)

D = Not started or getting started (indicative completion level less than 25 %)

The conclusions of the adaptation status review are presented in Chapter 4 of the Climate Plan 2029.

Actions	Self check of the Status	Comments
Adaptation commitments defined/integrated into the local climate policy	B	Progress has been made for example through projects, but challenges remain, including the lack of permanent resources, poor participation opportunities for vulnerable groups, and the coordination of cross-organizational cooperation in the region.
Human, technical and financial resources identified	C	
"Adaptation team (officer) appointed within the municipal administration and clear responsibilities assigned"	C	
Horizontal (i.e. across sectoral departments) coordination mechanisms in place	B	
Vertical (i.e. across governance levels) coordination mechanisms in place	B	
"Consultative and participatory mechanisms set up, fostering the multi-stakeholder engagement in the adaptation process"	B	
"Continuous communication process in place (for the engagement of the different target audiences)"	C	
"Mapping of the possible methods & data sources for carrying out a Risk & Vulnerability Assessment conducted"	A	The level of knowledge is already good, but as knowledge increases, shortcomings have been identified, especially in the assessment of vulnerabilities.
Assessment(s) of climate risks & vulnerabilities undertaken	B	
Possible sectors of action identified and prioritised	B	
Available knowledge periodically reviewed and new findings integrated	B	
Full portfolio of adaptation options compiled, documented and assessed	C	The integration of adaptation into design processes is being developed.
"Possibilities of mainstreaming adaptation in existing policies and plans assessed, possible synergies and conflicts (e.g. with mitigation actions) identified"	B	
"Adaptation Actions developed and adopted (as part of the SECAP and/or other planning documents)"	B	
Implementation framework set, with clear milestones	C	Progress has been made in the systematic implementation of measures, such as the implementation of green efficiency obligations and the inclusion of adaptation perspectives in investment planning.
"Adaptation actions implemented and mainstreamed (where relevant) as defined in the adopted SECAP and/or other planning documents"	B	
Coordinated action between mitigation and adaptation set	B	
Monitoring framework in place for adaptation actions	C	Monitoring is developing, but it is still general and fragmented. This is partly due to the underdevelopment of local-level indicators. National and international development work is also being carried out in the development of indicators.
Appropriate M&E indicators identified	C	
Progress regularly monitored and reported to the relevant decision-makers	C	
"Adaptation strategy and/or Action Plan updated, revised and readjusted according to the findings of the M&E procedure"	B	

