TAMPERE.
FINLAND

CARBON NEUTRAL TAMPERE 2030

ROADMAP

Tampere City Board 31 August 2020.

CONTENTS

INTRODUCTION

Cities have a major responsibility in the fight against climate change. Greenhouse gases that trap heat in the atmosphere are largely generated in the urban environment. Urban growth increases construction and traffic volumes. Growth and vitality cluster in cities, but so do consumption and trade, which are sources of wealth.

Urban growth must be sustainable, which requires success in three areas. Firstly, we need to develop models of housing and urban life with sustainable life-cycles. Secondly, we need to move from fossil energy to renewable energy sources. Thirdly, a transport system must be built based on sustainable modes of transport and the use of renewable fuels.

Climate action is also an opportunity to create new and sustainable business. Tampere has been a forerunner at various stages of its history, both in harnessing hydropower for industrial use and in the emergence of large-scale industry. Tampere is also a forerunner in the competence-based knowledge economy as well as in culture and the experience economy. We can be forerunners and trailblazers in solutions based on clean technology and for climate-friendly economy.

Tampere has a strong track record in building a sustainable city. Greenhouse gas emissions took a downturn in 2010, and our goal is to be a carbon neutral city by 2030. The goal is ambitious but achievable with bold decisions. Emissions per capita have already fallen by almost half since 1990. Tampere's growth can be sustainable and, at the same time, we can reduce emissions.

There is still a way to go, however. We need to pick up the pace because we only have ten years left. The Carbon Neutral Tampere 2030 Roadmap presents 236 measures that various city units have decided to take to achieve carbon neutrality in Tampere.

The roadmap contains major actions such as the conversion of the Naistenlahti Power Plant, the construction of the tramway, the conversion of bus fleet to low emission, the construction of a biogas power plant, the replacement of outdoor lighting with smart LEDs and the energy renovation of the city's service buildings.

There are also various everyday small-scale actions that have a big impact. These include improving recycling, promoting the sharing economy, sustainable procurement and increasing the offering of vegetarian food. Sustainable lifestyles must become part of the everyday lives of all city personnel.

It is great that all the service areas, the city's public utilities and companies have started to build a path towards a carbon-neutral city. When the measures in the roadmap are transferred to the annual plans and the climate budget in the city's budget, they are also translated from words into action. In the coming years, the roadmap will be updated. This will ensure the achievement of the 80% reduction target and the 20% compensation target.

The Carbon Neutral Tampere 2030 Roadmap describes the city's climate achievements, but at the same time it invites companies, communities and all Tampere residents to a climate partnership. The roadmap will be published online as a digital platform where residents of the city can monitor the achievement of the goal. Together we will make Tampere carbon neutral by 2030!

Lauri Lyly
Mayor of Tampere

PREFACE

The Carbon Neutral Tampere 2030 Roadmap was prepared in cooperation with the city's service areas and various departments during 2019 and the spring of 2020. The Sustainable Tampere 2030 programme was in charge of the preparations. The purpose of the roadmap is to describe the city's measures to achieve carbon neutrality by 2030. The wide range of actions taken by residents, businesses and communities or by the state and other public bodies are not described in this roadmap.

The measures are presented under six themes: urban planning, mobility, construction, energy, consumption and nature. The themes arise from the City of Tampere's environmental policy, the Sustainable Tampere 2030 Guidelines. The perspective of the roadmap is limited to climate change mitigation. However, these measures must not undermine other dimensions of sustainable development – ecological, social, economic or cultural. Several measures therefore contribute to many sustainable development targets.

The themes are represented with different colours in the roadmap. The beginning of each theme gives a summary of the measures related to the theme, along with the targets and indicators with which the achievement of the targets will be monitored. It also presents a snapshot of where we are at the moment.

There are several sets of measures, or measure packages, under each theme, a total of 37. They cover the main sources of emissions that the city can influence. The roadmap is phenomenon-based and does not follow the administrative structure of the city. Therefore, several bodies may be responsible for a measure. Climate change mitigation requires extensive cooperation both within the city and with stakeholders.

It is advisable to read the roadmap opening-by-opening. The left-hand side of the opening has a card presenting the measure package, numbering the related actions, timetable and responsible parties. The timetable is presented by council term. At the bottom of the card, bullet symbols show an estimate of the magnitude of the emission reductions and costs of the measure package.

After the action card, the content of the measures and the emission and cost effects are illustrated with case examples. The focus of the cost analysis is on the direct costs or cost savings of the measures affecting the city's finances, both in terms of investment and operating expenses. In particular, consideration has been given to the additional costs that need to be incurred in order to achieve the carbon-neutrality goal. Cost estimates are based either on data and estimates from different units, public utilities or companies in the city organisation, or on more precise calculations produced by the Sustainable Development Unit. When looking at the figures, it should be borne in mind, that the measures of the roadmap are often taken for other reasons than climate change alone.

In the cost analyses, development in line with the Sustainable Tampere 2030 Guidelines (KT2030 scenario) have been compared with the development in the current situation (Current development). The cost effect is therefore the difference between the development trajectories of KT2030 scenarios and business as usual. As regards the fuel sources for vehicles, the evolution of costs has also been examined under the EU Clean Vehicles Directive (EU scenario). In terms of those measures for which it has been possible to determine an emission reduction estimate, the price per tonne of reduced emissions of the measure is also presented. The cost estimates have been published in their entirety as a separate annex "Tampereen kaupungin hiilineutraaliustavoitteen toimenpiteiden kustannusarvioiden taustamuistio".

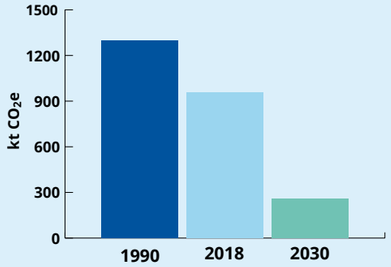
At the end of the roadmap, there is a summary chapter on the emission impacts and costs of the measures. According to the roadmap impact assessment, the city's measures will achieve a 72% reduction in greenhouse gas emissions by 2030. However, it has not yet been possible to assess the impact of all measures. The most important factor left unassessed are measures that affect the mobility choices of local residents, for example, through Detailed Planning and the development of the transport system.

If they succeed and the climate partnership brings companies, communities and city residents to active climate work, it will be possible to achieve the 80% reduction required for carbon neutrality. This necessitates ambitious and long-term climate work from the city. The intention is also to update and refine the roadmap in terms of emission and cost estimates as information on the impact of the measures and new practices and solutions becomes available.

SUMMARY

TARGET

2030 → **Carbon neutral Tampere**



Tampere greenhouse gas emissions in 1990 and 2018. Target 2030.

How?

6 → **236**

Six themes:
urban planning, mobility, construction, energy, consumption, nature.
236 measures.

Together

We created the roadmap together with the city's service areas and units. We also need all residents, businesses and communities to be involved.

What?

80 % + **20 %**

Reduction of greenhouse gas emissions 80%. Carbon sinks or compensation 20%.

Developing

We use indicators and results to develop and update the roadmap.

Why?

BEST FOR YOU

The target is based on, for example: the Tampere Strategy 2030, the Sustainable Tampere 2030 Guidelines, the Covenant of Mayors for Climate and Energy, and the UN 2030 Agenda for Sustainable Development.

Future

Climate change mitigation and sustainable development are vital for a secure future.

RESULT

72%

With the city's measures described in the roadmap, we can achieve an emission reduction of around 72% by 2030. The full impact of all measures cannot be assessed yet. The carbon-neutrality goal can only be achieved through cooperation between the city, its residents, businesses and communities.

ROADMAP READING GUIDE

The beginning of each theme presents the content, targets, indicators and starting points of the theme. Each theme is represented by a colour, with first a general description of the theme followed by action cards.

Target benefit 2030: Theme key targets for 2030 based on the Sustainable Tampere Guidelines.

Description: Summary of the targets and measures of the theme.

Target 2030: Quantitative and qualitative targets for 2030.

Indicators: Indicators by which the achievement of the targets will be monitored.

Introductory data: Strategic programmes and plans on which the roadmap is based.

Situational picture: Examples of indicators to monitor the achievement of targets.

After the presentation of the theme, each set of measures has its own action card containing the measures related to the package.

The theme number and title to which the action card relates.

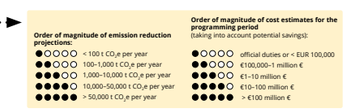
The action card number and title.

The measures, their timetable by council term and the main city bodies responsible.
Examples or impact assessments of the circled measures can be found on the adjacent pages.

Estimated emission reductions and costs and benefits unrelated to emission reductions of the activity card.

INTERPRETATION OF THE IMPACT PROJECTIONS OF THE ACTION CARDS

The order of magnitude of the bullet symbols for emission reductions and cost estimates are shown in this table on page 13. The programming period refers to ten years (until 2030).



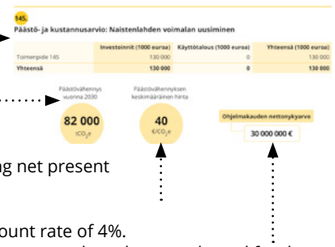
The content of the measures and their impact on emissions and costs is illustrated through examples. For some, only the costs are presented, and for others the emission reduction and its economic effects have also been estimated.

Budgetary impact: Direct cost to the city's finances. A negative value means cost savings. This figure does not take into account how the measure is financed (e.g. government support).

Emission reduction: Emission reduction achieved through the measure in 2030.

Efficiency: The cost of the emission reduction, i.e. its cost-effectiveness, calculated using net present value. A negative value means both cost savings and emission reductions.

Profitability: Net present value of the measure over the programming period at a discount rate of 4%.
A negative value means cost savings. The life-cycle investment costs beyond the 2030 target year have been evaluated for the programming period. For example, 20% of the cost of an investment in 2025 over a 25-year holding period is taken into account. (2030–2025)/25 = 20%.



DEFINITIONS AND ABBREVIATIONS

Alternative/sustainable/ clean Fuel sources	Fuel sources to replace petrol and diesel, such as electricity, biogas, hydrogen, ethanol and renewable diesel.
Biofuels	Fuels made of organic materials such as wood, logging waste or plants.
BREEAM	Building Research Establishment Environmental Assessment Method, a certification issued to eco-efficient buildings or areas (similar to LEED).
Carbon balance	Change in the amount of carbon in a carbon storage, such as a forest, per unit of time (year). For example, in the case of forests, the carbon balance takes into account carbon sequestered by plant growth, deforestation and plant decay, and carbon sequestered or released by the soil.
Carbon footprint	Sum of greenhouse gases produced during the life cycle of a product or service.
Carbon sink	A function that removes carbon dioxide from the atmosphere. Carbon sinks can be either natural (such as growing forests), chemical (such as concrete carbonation) or artificial (technologies to be developed).
Carbon storage	Atmospheric carbon stored in a product or material. For example, about half of the dry weight of wood is atmospheric carbon.
Circular economy	In a circular economy, products and materials as well as the value attached to them circulate in the economy for as long as possible. In this way, production and consumption generate as little waste and loss as possible.
Climate budget	A practice started in the City of Tampere's 2020 budget, which sets the emissions budget for the coming years in order to achieve the climate targets and identifies key current climate measures as well as their cost effects and emissions impacts.
CO2/CO2e	Carbon dioxide; abbreviation for carbon dioxide equivalent, the combined climate-heating effect of different greenhouse gases converted to the equivalent quantity of carbon dioxide.
Demand response	Reducing the use of energy in suitable locations at peak times and rescheduling this consumption to a different time where energy can be produced more cheaply and easily.
Direct/indirect emissions	Distribution used in the calculation of municipal greenhouse gases, where direct emissions are emissions generated on municipal territory and indirect emissions are emissions from production and consumption that occur outside the municipality.
Discounting	Discounting is used to convert future cash flows to present value at a discount rate, so that the cash flows from different years are commensurate. A discount rate of 4% has been used in the calculations of the roadmap.
Ecosystem services	Free, tangible and intangible human benefits from the natural environment, such as nutrition and water, building materials, nutrient recycling, soil formation, climate regulation, water and air purification, aesthetics and recreation.
Energy community	A community of citizens or organisations (e.g. housing associations) that generates and distributes energy within the community or, where appropriate, sells it to an external network.
Energy efficiency agreement for municipalities (KETS)	A voluntary agreement through which the state and industries fulfil the international energy efficiency obligations imposed on Finland without new legislation or other coercive measures. The objective of the agreement is to increase energy efficiency and renewable energy in municipal buildings, public lighting and vehicles. Similar agreements also exist for many other sectors.
ESCO	Energy service company, an energy-saving as a service operating model, where the service provider is responsible for improving the energy efficiency of the building as an overall delivery.
First and last mile solutions	Services facilitating the transition to a public transport stop or from a stop to their destination.
Green factor	Detailed Planning tool to ensure sufficient green area on plots while preventing stormwater flooding. The green stormwater describes how much the plot has vegetation and water detention solutions in relation to the area of the plot.
Life-cycle assessment	Life-cycle assessment (LCA) is a method for assessing the environmental impact of a product or service throughout its life cycle (manufacture, use, disposal).
MaaS	Mobility as a Service offers customers a comprehensive service where they can combine public transport, car rental or transport services according to their needs.
MAL	Agreements on land use, housing and transport (MAL) are agreements concluded by the state with the largest city regions with the aim of steering the urban structure in accordance with sustainable development.
Municipal waste	Waste covered by municipal waste management, generated in the consumption of end products in households and also in enterprises, especially in the service sectors.
Net present value	Net present value (NPV) is the value of all future cash flows, including investment and operational costs, discounted to the present. In the roadmap calculations, the net present value has been evaluated for the programming period, i.e. until 2030.
Net zero energy building/ nearly-zero energy building/ plus energy building	A building that generates the same amount of renewable energy for use outside the building as it uses energy imported into the building. A nearly-zero energy building (equivalent to the Energy Performance of Buildings Directive EPBD) is a building whose energy needs are covered by a significant part of the renewable energy produced in or around the building. A plus energy building is a building that produces more energy than it consumes.
Open data	Public information produced or accumulated by public administrations, organisations or undertakings and opened in a digitally accessible form for free use by all.
Programming period	The time span for the roadmap measures is 2020–30. The years used in the cost calculations are 2021–30.
Public transport trunk lines	Public transport routes with a high number of passengers, shorter headways and various solutions to speed up public transport. The aim of the trunk lines is to provide a public transport service level that enables life without owning a car.
Renewable energy	Renewable energy sources include forest processed chips and other bioenergy, solar heat and electricity, wind power and heat produced by heat pumps from the ground, air and water.
Scenario	Assumption for future life-cycle stages and their environmental impact. The roadmap compares the impact of the measures in three scenarios: current development, EU scenario (for fuel sources) and KT2030 scenario (Sustainable Tampere 2030).
SECAP	Sustainable Energy and Climate Action Plan, which is based on the Covenant of Mayors for Climate and Energy.
Service facility network/Service network	The service facility network comprises all the physical service facilities maintained by the city, such as social and health centres, maternity and child health clinics, schools, day-care centres and sports and leisure facilities. The service network also includes non-physical services, such as digital services.
Smart parking	Smart parking makes use of information technology and real-time data transmission to enable more efficient use of parking space, such as bicycle parking and parking of autonomous vehicles.
TAPRE instructions	Energy efficiency guidelines for Tampere service buildings developed by the municipalities of the Tampere City Region.
Transport modal share	Share (%) of journeys made by different modes of transport (walking, cycling, car, public transport), either in terms of number of journeys (number/person/day) or in terms of personal output (km/person/day).
Travel chains	Integration of different modes of transport into a smooth whole.
Zero Fibre	Waste sludges from the production of pulp mills, which were previously discharged with wastewater into the water system and which are present in large quantities at the bottom of Lake Näsijärvi in Hiedanranta.

1. CLIMATE TARGETS OF THE CITY OF TAMPERE

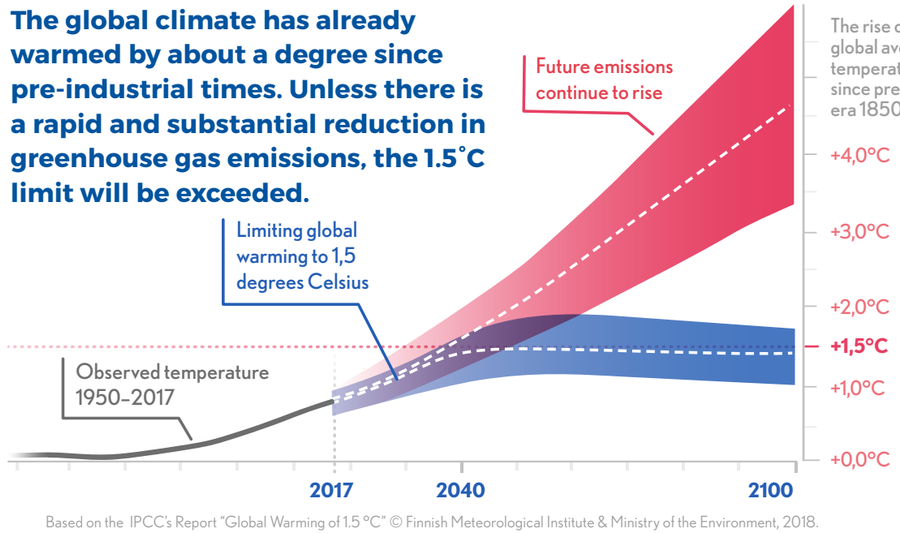
Why do we have global warming?

Global warming, or the growing greenhouse effect, is one of the biggest global crises. It is caused by an increase in atmospheric carbon dioxide, which, like a greenhouse, heats the earth. Since the late 19th century, the rise in CO_2 levels has accelerated as a result of increased use of fossil energy. The global average temperature has risen by about a degree compared to pre-industrial times and is projected to rise by about 2–5 degrees by the end of the century in various scenarios.

Global warming has a major impact both on societies and the natural environment. In Finland, vegetation zones are retreating towards the north, and flood risks and the operating conditions of forestry and agriculture are changing. Finland will experience significant impacts through the global economy and international politics. On the other hand, Finland can also benefit if it succeeds in developing and exporting technology that mitigates climate change.

It is too late to halt climate change, but it is still possible to mitigate it. The objective of the 2015 Paris Agreement is to limit the global average temperature increase to well below 2°C compared to pre-industrial levels and to pursue measures to limit global warming to less than 1.5°C. The EU and Finland have also committed themselves to this objective.

The global climate has already warmed by about a degree since pre-industrial times. Unless there is a rapid and substantial reduction in greenhouse gas emissions, the 1.5˚C limit will be exceeded.



Based on the IPCC's Report "Global Warming of 1.5 °C" © Finnish Meteorological Institute & Ministry of the Environment, 2018.

Figure 1: *Increase in global average temperature. Source: www.ilmasto-opas.fi*

The abandonment of fossil fuels, introduction of renewable energies, energy savings and improvements in energy efficiency are important ways of curbing rising temperatures. The focus will also be on reducing transport emissions through a shift to alternative fuel sources and increasing the use of sustainable modes of transport by improving conditions for walking and cycling and the public transport service level. In addition to reducing greenhouse gas emissions, the management of carbon storage in forests and green areas, as well as the growth of carbon sinks, are important means of curbing global warming.

Cities playing a major role

Cities play a major role in mitigating and also adapting to climate change, as an increasing proportion of people live in cities and, as a result, the majority of consumption and use of energy takes place in cities. Cities can show the way to climate-friendly solutions and enable sustainable ways of living, energy use and mobility.

The City of Tampere has been a forerunner in climate work. Tampere joined the EU Covenant of Mayors in 2009 and the renewed Global Covenant of Mayors for Climate and Energy in 2017. Today, it is the world's most significant climate covenant, involving thousands of cities, boosting local climate and energy efforts. Its signatories pledge to reduce greenhouse gas emissions by at least 40% by 2030.

Tampere's goals are even more ambitious. In its 'The Best for You' city strategy, Tampere set the goal of reaching carbon neutrality by 2030. The goal is defined as an 80% reduction from the 1990 emission level while compensating the remaining 20%. According to the strategy, emissions should be reduced by 40% by the end of the council term, that is by 2021, compared to 1990.

Aiming at a carbon-neutral Tampere

On 18 June 2018, the City Council approved the Sustainable Tampere 2030 – Towards a Carbon-neutral City Guidelines, which combine environmental policy, sustainable development and the carbon-neutrality goal of the Tampere Strategy and guide the implementation and monitoring of the package.

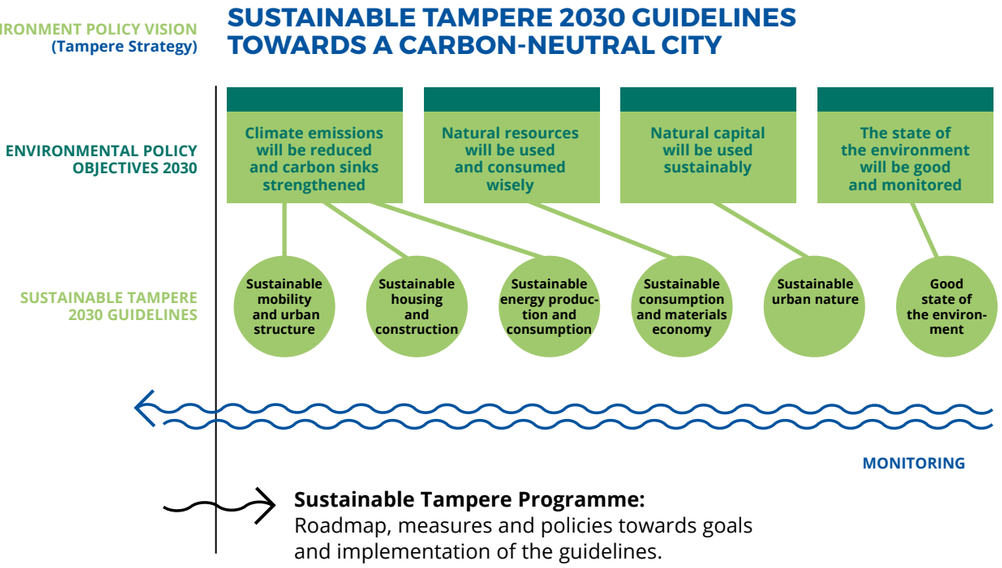


Figure 2: *Sustainable Tampere 2030 Guidelines*

The Sustainable Tampere Guidelines cover key themes for climate emissions: mobility and urban structure, housing and construction, energy, consumption and urban nature. Furthermore, in line with sustainable development, the objective is to achieve good state of the environment in other respects too.

The guidelines set a target state for each theme:

1. **Sustainable mobility and urban structure:** Tampere will be a forerunner in sustainable urban planning, mobility and working methods. Preparations have been made for the risks brought about by climate change. The living environment will be safe, healthy and attractive.
2. **Sustainable housing and construction:** Residential areas will be attractive and distinctive and support sustainable lifestyles and inclusion. Good opportunities for nature experiences will support the well-being of residents. Construction will create the conditions for safe, healthy and comfortable living.

Continues on next page >

3. **Sustainable energy production and consumption:** Energy sources are low emission. Energy will be used efficiently as smart heating, cooling and electricity networks, energy storage and smart buildings work together. Smart solutions and energy services will also reduce consumption peaks of electricity and heat.
4. **Sustainable consumption and materials economy:** The use of materials will be governed by the principles of the circular economy. The city will support sustainable consumption solutions for residents.
5. **Sustainable urban nature:** Resources will be used sustainably and carbon sinks have been strengthened. Biodiversity and urban greenery have been increased while nature tourism has been developed.
6. **Good state of the environment:** Environmental impacts of the operational life-cycles will be identified and managed throughout the city organisation. The state of the environment will be monitored and improved. Monitoring data will be publicly available, also for decision-making.

Following the approval of the guidelines, the City Board decided on 26 November 2018 to launch the Sustainable Tampere 2030 Programme as part of the Smart Tampere Development Programme. The Sustainable Tampere 2030 programme implements the Sustainable Tampere guidelines in cooperation with all service areas, public utilities and companies of the city. Enterprises, communities, universities and educational institutions are also partners in the programme. A key objective of the programme is to develop, in cooperation with city units, a roadmap to achieve the carbon-neutrality goal.

The Carbon-neutral Tampere 2030 Roadmap is based on the Sustainable Tampere 2030 Guidelines. However, the roadmap focuses on climate action, specifically. Therefore, the structure of the roadmap differs slightly from the guidelines: Sustainable mobility and urban structure are divided into two themes, sustainable urban planning and sustainable mobility. The 'Good state of the environment' theme has been omitted from the roadmap because it mainly concerns areas of environmental policy other than climate policy.

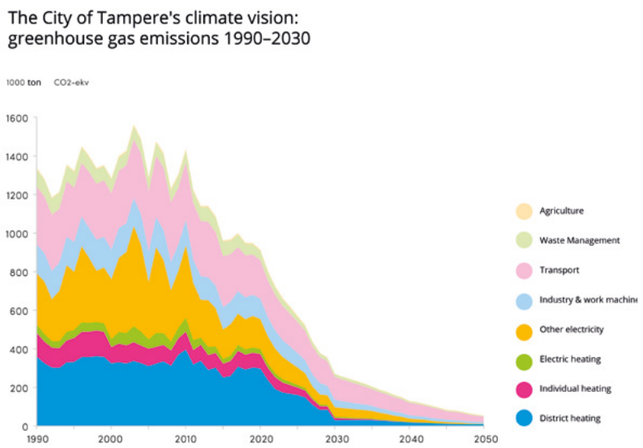


Figure 3: *The City of Tampere's climate vision: greenhouse gas emissions will decrease by 80% by 2030 compared to 1990.*

Figure 4: *The SDGs of the UN 2030 Agenda for Sustainable Development.*

The Sustainable Tampere 2030 guidelines, programme and roadmap also implement the Sustainable Development Goals (SDGs) adopted by the UN in 2015. While the roadmap measures specifically address SDGs 7, 9, 11, 12, 13, 15 and 17, the starting point is that climate goals will be pursued through integrated sustainable development, and climate action must not undermine other sustainable development goals.

2. PREPARATION OF THE ROADMAP

The Carbon Neutral Tampere 2030 Roadmap was prepared by the Sustainable Tampere 2030 Programme, launched by the City Board and operating under the Sustainable City group in the Urban Environment and Infrastructure Services. The programme is part of the Smart Tampere Programme and its objective is to promote the city's carbon-neutrality goal and coordinate climate work.

The roadmap was drawn up such that the groups and units in each service area, in cooperation with the Sustainable Tampere 2030 Programme, drew up their own proposals for the roadmap measures. This process was carried out during 2019 and spring 2020. Based on the proposals given by the service areas, the Sustainable Tampere 2030 Programme compiled this roadmap for the entire city. The city's companies aim to prepare their own carbon neutrality roadmaps during 2020. This roadmap also includes known measures of the city's companies.

The measures presented in the roadmap aim to reduce Tampere's greenhouse gas emissions by at least 80% by 2030. The remaining 20% is to be tied to the carbon sinks of the Tampere region or compensate by other means. A plan for this will be drawn up after 2025, when the impact of emission reduction measures and the functioning of compensation schemes are witnessed.

Emission reductions are calculated using a method that is commonly used by municipalities and internationally comparable (CO_2report in 2020). The calculation covers the global-warming emissions (carbon dioxide, methane, nitrous oxide) generated in the city of Tampere. Greenhouse gas emissions have been aggregated to carbon dioxide equivalents (CO_2e). On the other hand, indirect emissions arising, for example, from the manufacture of goods and materials elsewhere and from imports to Tampere or from the travelling of Tampere residents outside the city are not included in the calculation. However, measures in the roadmap also aim to reduce these emissions.

The aim is for the city units to include measures from the completed roadmap to the annual plans of service areas and to the work programmes of the units when the implementation of measures is topical. The roadmap is an outline and plan of the city's measures to achieve the carbon-neutrality goal. The measures will be decided on separately by the relevant bodies in accordance with the city's normal decision-making system.

In addition to the emission reduction estimates of the measures, the roadmap also shows the costs of the measures and, where possible, the benefits in euros. For some of the measures, the information is given in figures, as far as available. In addition, emission reductions and costs of the measure packages have been estimated in orders of magnitude ("bullet symbols" on the cards).

The measures presented in the roadmap often also have benefits unrelated to climate, such as a more attractive, healthier and safer environment, business opportunities brought about by new technologies, economic sustainability brought about by life-cycle thinking, increased biodiversity and image benefits. Examples of these are mentioned in the action cards.

INTERPRETATION OF THE IMPACT PROJECTIONS OF THE ACTION CARDS

Order of magnitude of emission reduction projections:

- ●○○○○ < 100 t CO_2e per year
- ●●○○○ 100–1,000 t CO_2e per year
- ●●●○○ 1,000–10,000 t CO_2e per year
- ●●●●○ 10,000–50,000 t CO_2e per year
- ●●●●● > 50,000 t CO_2e per year

Order of magnitude of cost estimates for the programming period
(taking into account potential savings):

- ●○○○○ official duties or < EUR 100,000
- ●●○○○ €100,000–1 million €
- ●●●○○ €1–10 million €
- ●●●●○ €10–100 million €
- ●●●●● > €100 million €

3. WHERE WE ARE NOW

Tampere's greenhouse gas emissions increased until 2010, but have decreased since then, although the decline has halted in recent years. In 2018, total emissions were about 26% lower than in the reference year 1990. Emissions per capita were decreasing more clearly, being 45% lower in 2018 than in 1990. Tampere has the lowest per capita emissions compared to similar-sized cities in Finland, 3.5 tonnes of CO_2e, not considering industrial emissions for reasons of comparability.

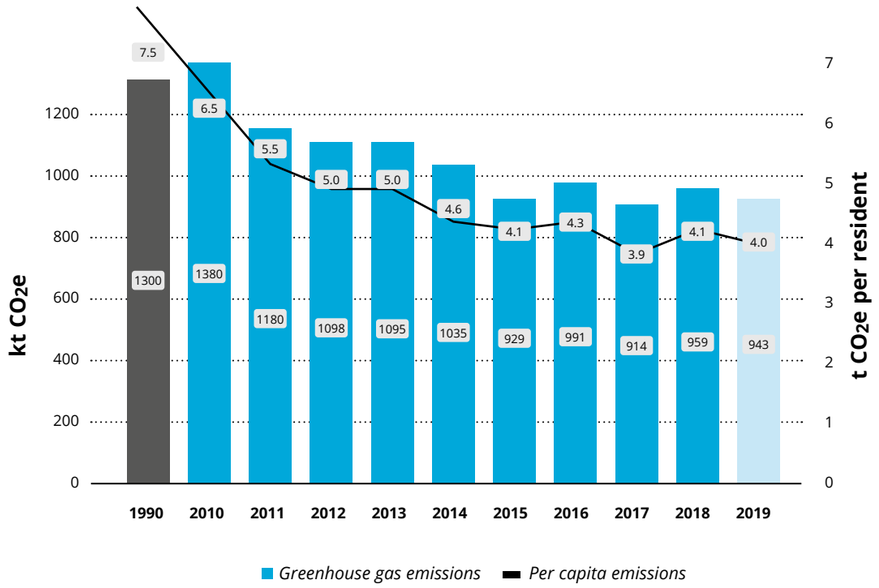


Figure 5: *Development of carbon dioxide emissions in Tampere in 1990–2018, and preliminary data for 2019. Source: CO_2 report 2020.*

The main sources of emissions in Tampere are district heating, road transport and consumers' electricity consumption. Industry, individual heating and waste management are also major sources of emissions. Agriculture, on the other hand, plays a minor role in Tampere.

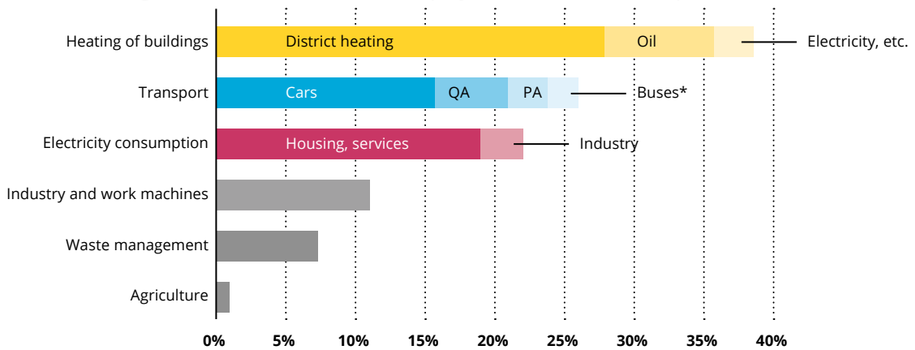


Figure 6: *Sources of greenhouse gas emissions in Tampere 2018. Source: City of Tampere/Sustainable Development Unit.*
** QA = lorries, PA = vans*

The need for emission reductions in different sectors in order to achieve an 80% reduction in total emissions is quite high. The assessment presented in Figure 7 was carried out in 2017 in preparation for the carbon-neutral Tampere goal-setting and has also served as a starting point for roadmap work.

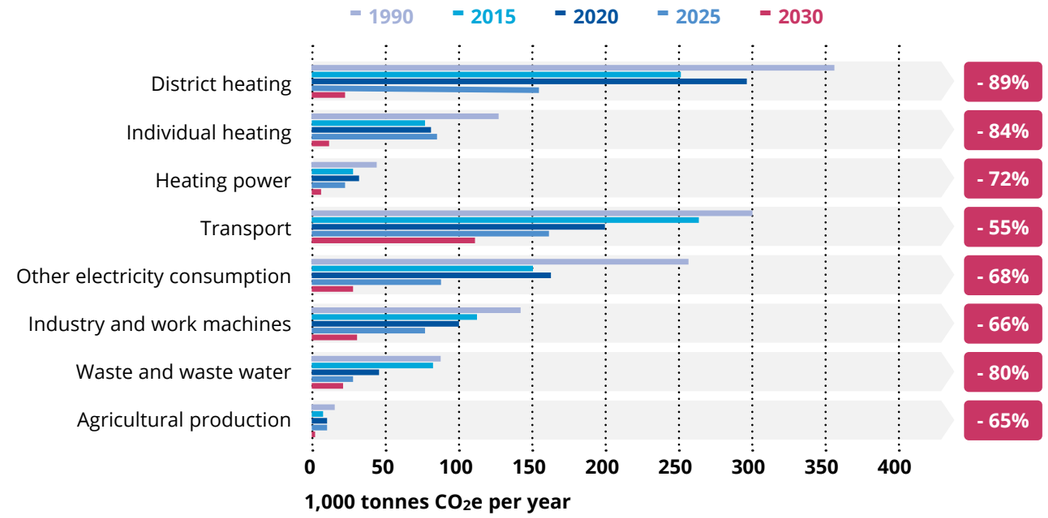


Figure 7: *Sector-specific emission reduction needs for the period 2015–30. The change corresponds to an overall emission reduction target of 80% from the baseline year 1990. Source: SECAP report 2019.*

The situation in recent years, where the decline in emissions has stalled, is partly explained by the fact that Tampereen Sähkölaitos has had a break from major investments in renewable energy. The city-owned energy group has been preparing the conversion of the Naistenlahti Power Plant, which will take place in 2020–21. This will once again significantly reduce emissions of district heating.

Reducing emissions of individual heating and heating electricity requires detached houses and other individual buildings to switch to renewable energy sources. The change is taking place thanks to the increased popularity of heat pumps, among other reasons. In order to achieve this demanding objective, the roadmap emphasises providing energy advice to private property owners.

With regard to transport, achieving of the emission reduction target is most challenging, as the population of Tampere is growing and modal shifts are slow to take root. In addition, decisions on modes of transport are not in the hands of the city alone, but require the cooperation of both the state and individual citizens. The city can and strives to improve the conditions for choosing sustainable mobility. In the roadmap, therefore, measures for sustainable mobility play a big role.

Other electricity consumption can be reduced by improving the energy efficiency of electricity use and increasing demand response. This is also largely in the hands of city residents, but the city can promote it in its own activities and by enhancing energy counselling. Electricity emissions are most affected by the development of the national electricity emission factor.

Reducing emissions from industry and work machines requires an active approach from companies. The city can set an example, and Tampere is also launching climate partnership activities, where businesses and communities commit to a common carbon-neutrality goal with measures that suit them.

Efforts are being made to reduce emissions from waste management by improving waste prevention, waste sorting and circular economy solutions. However, a large part of these emissions is methane generated by old landfills.

Emissions from agriculture and forestry are low in Tampere, but forests play an important role as carbon sinks, and the measures in the roadmap aim to strengthen them.

4. ROADMAP

The Carbon Neutral Tampere 2030 Roadmap is based on the themes of the Sustainable Tampere Guidelines and the resulting benefit goals. The 'Good state of the environment' theme has been omitted from the roadmap because it includes aspects of environmental protection other than climate change mitigation. The first theme of the guidelines, transport and urban structure, is divided into two parts: sustainable urban planning and a sustainable transport system.

The six benefit targets comprise 37 measure packages with a total of 236 measures.

Implementation of the roadmap

1. The City Board will approve the roadmap and annually monitor the implementation of the measures as part of the reporting of the Smart Tampere Programme/Sustainable Tampere Sub-programme. The roadmap action cards and emissions calculation will be updated as part of the Sustainable Energy and Climate Action Plan (SECAP) every two years.
2. Measures to be taken to mitigate and adapt to climate change in the city organisation, their emission reduction estimate and the financial resources budgeted for implementation (so-called climate budget) will be included from the roadmap in the city's budget annually.
3. Annual targets and measures will be included from the roadmap in the annual plans of service areas. Service areas and their groups will update their own roadmap in cooperation with the Sustainable Tampere 2030 Programme and are responsible for inclusions in service and annual plans.
4. The Sustainable City Group is responsible for monitoring, reporting and updating the roadmap of the entire city.
5. The roadmap is published as an open digital platform, where the city's partners can also announce their climate actions (as part of the Climate Partnership model).

CARBON NEUTRAL TAMPERE 2030 ROADMAP
Themes, benefit targets and measure packages

1. Sustainable urban planning	2. Sustainable mobility		3. Sustainable construction	4. Sustainable energy	5. Sustainable consumption	6. Sustainable urban nature
Benefit target 2030: The city will grow primarily into public transport zones and regional centres.	**Benefit target 2030:** The modal share of sustainable modes of transport will be 69%.		**Benefit target 2030:** New construction will be at zero-energy level and the carbon footprint of housing small.	**Benefit target 2030:** Renewable energy will amount to 80%.	**Benefit target 2030:** Consumption will be sustainable and the circular economy functioning.	**Benefit target 2030:** Urban nature and structures will bind carbon and climate change has been prepared for.
1.1. Climate impact assessment	**2.1.** Tram transport	**2.6.** Road transport	**3.1.** New construction of city properties	**4.1.** Centralised renewable energy	**5.1.** Waste management	**6.1.** Carbon sinks of forests
1.2. Conditions for sustainable mobility	**2.2.** Local train transport	**2.7.** Transport equipment and work machines	**3.2.** Guidance of private new construction	**4.2.** Smart energy networks and services	**5.2.** Circular economy	**6.2.** Urban green carbon sinks
1.3. Strengthening green belts	**2.3.** Bus transport	**2.8.** New mobility services	**3.3.** Repair construction of city properties	**4.3.** Decentralised renewable energy	**5.3.** Sustainable consumption	**6.3.** CO_2emissions from landscaping and storm-water area construction
1.4. Five-star City Centre	**2.4.** Level of service in public transport	**2.9.** Mobility management	**3.4.** Repair construction of private properties	**4.4.** Abandoning oil heating	**5.4.** Meals	**6.4.** Climate change adaptation measures
1.5. Carbon-negative Hiedanranta	**2.5.** Pedestrian and bicycle traffic		**3.5.** Timber construction		**5.5.** Procurement	**6.5.** Emission compensation
			3.6. Infrastructure construction		**5.6.** Raising environmental awareness	
			3.7. Use of recycled materials		**5.7.** Sustainable business and events	

Figure 8: *Carbon Neutral Tampere 2030 Roadmap Themes, benefit targets and measure packages.*

THEME 1 SUSTAINABLE URBAN PLANNING

Benefit target 2030: The city will grow primarily into public transport zones and regional centres

DESCRIPTION	Tampere grows by approximately 3,000 residents annually. The aim is to enable sustainable growth while preserving the quality and functionality of the urban environment. Planning will be targeted at the city centre, regional centres and key public transport zones. Assessment of the climate impact of urban structures is increasingly central to land use planning. This aims to create the economic conditions for an efficient service structure, energy system and public transport system, to reduce the need to own or use a private car, to reduce emissions from mobility, to support walking and cycling on everyday journeys, and to conserve nature and natural resources. Land-use planning takes into account the conservation of biodiversity and sufficient green belts. The growth of the city creates increasing operating pressures on forests and nature areas, and therefore the extension of construction areas to green belts must be carefully considered. Value-based information and indicators derived from ecosystem services will be used as part of the content and impact assessment of land use planning.
Target 2030	• Residential floor area planned for public transport zones and regional centres: 80% (2021), 85% (2025), 90% (2030). • Tampere city centre will have 15,000 new residents and 15,000 more new jobs in 2030 compared to 2015. • The urban structure will be mixed in the city centres and in the surroundings of major tramway stops and public transport transfer terminals. • The urban structure will support walking, cycling and the use of public transport on everyday journeys. • Residents will be satisfied with the attractiveness and usability of the urban environment.
Indicators	• Planned residential floor area in public transport zones and regional centres (%) • Share of households (%) with a 300m or 700m distance to the main public services • Share of recreational areas in the total Detailed Planning area of the inner city (%) • Residents' satisfaction with the attractiveness and functionality of the urban environment in the continuous resident survey.
Starting point	• Tampere Strategy 2030 • Sustainable Tampere 2030 guidelines • Tampere City Region Structural Plan 2040 • Inner city master plan 2040 • Five-star City Centre Development Programme • Hiedanranta Development Programme

Situational picture: Realisation of indicators

Indicator	Unit	2014	2015	2016	2017	2018	2019
Planned residential floor area in regional centres and public transport zones	%	65	70	77	59	77	21

EXAMPLES AND IMPACT ASSESSMENTS

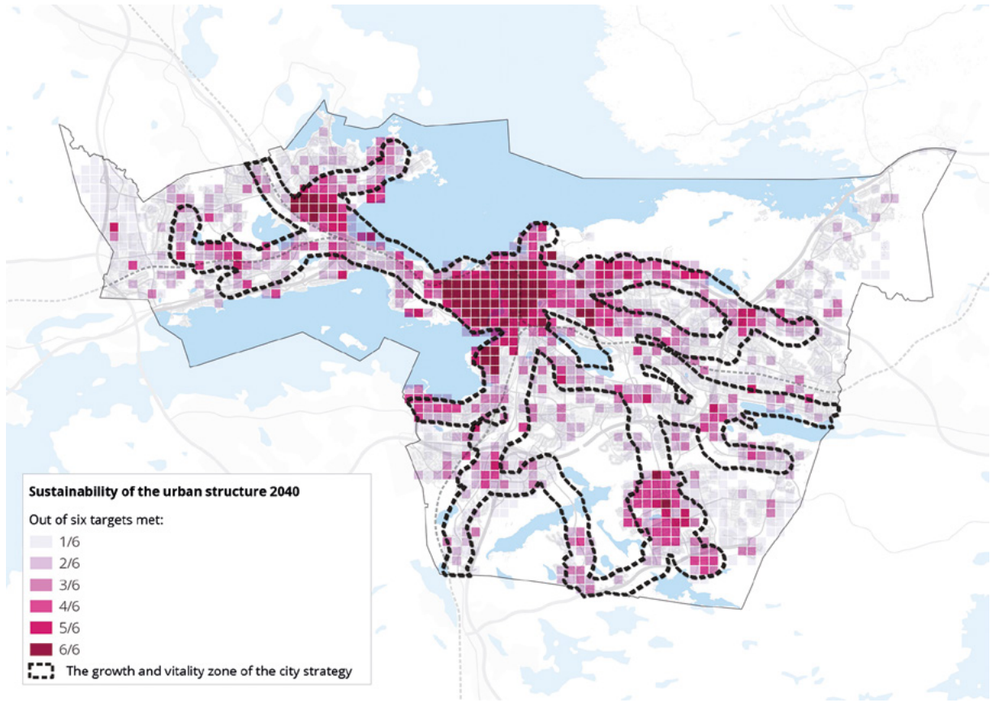


Figure 9: *The Tampere inner-city master plan assesses the sustainability of the urban structure using the following criteria:*

1. *Density enabling a public transport city, at least 35 residents and jobs per hectare,*
2. *density enabling a walkable city, with at least 100 inhabitants and jobs per hectare,*
3. *adequate urban mixing;*
4. *declining degree of motor vehicle ownership due to density: more one-car households than two-car households, the share of two-car households below 30%,*
5. *more car-free households than one-car households, the share of car-free households exceeds 40%,*
6. *relatively low mobility emissions.*

Most sustainability criteria are met in Tampere city centre and at the hearts of regional centres, where the population is dense.

©City of Tampere/Comprehensive Planning 2020.

Measure package 1.1.	Climate impact assessment	Timetable in council terms	Responsibility
DESCRIPTION **New tools and operating methods will be developed for the climate impact assessment of Detailed Planning**	1. A methodology will be developed for assessing the climate impacts of the urban structure, which will provide information to support planning and decision-making on the current and future emission and carbon sink impacts of alternative growth and development scenarios. The monitoring data of the current structure will be imported to a map service. The tool will be used to assess the impact of the master plan and to program town plans.	2020–29	Comprehensive Planning
The carbon balance of the urban structure of the Tampere region will be calculated	2. Municipalities in the Tampere region will draw up an urban structure energy-efficiency development programme, resource its implementation and introduce a tool to monitor the climate impact of the urban structure. (MAL agreement 2020–2023)	2020–21 2021–25	Tampere City Region, Comprehensive Planning
	3. In connection with the master plan and general plans, the CO_2 and energy-efficiency analyses prepared for the overall areas (e.g. Hiedanranta) will guide Detailed Planning and the terms and conditions of plot assignment. The climate impact of the town plan will be taken into account as a starting point for planning and the operating model recorded in the Detailed Planning quality manual.	2020–21	Comprehensive Planning, Detailed Planning, Sustainable City
	4. Procurement of expert tasks in Detailed Planning and transport planning will emphasise the city's carbon-neutrality goal, competence in climate impact assessment and a certified environmental management system.	2020–29	Comprehensive Planning, Detailed Planning, Transport System Planning Sustainable City
	5. Planning of the material balance will be continued in the Detailed Planning phase (at sites of more than 10,000 floor square metres) and the development of a monitoring tool to be created for soil management is promoted.	2020–21	Detailed Planning, Comprehensive Planning, Real Estate and Housing, Construction and Maintenance of Urban Environment
	6. Sustainability is promoted in the evaluation criteria and objectives of design contests.	2020–29	Detailed Planning, Comprehensive Planning, Real Estate and Housing, Transport System Planning, Green Areas and Storm Water Management, Sustainable City
Emission reduction	●●●○○ See explanations of the impact assessments on p. 13.		
Cost estimate	●○○○○ See reading guide on p. 13.		
Other benefits	• Increasing awareness of alternative community development scenarios • Enabling an economic and resource-efficient urban structure		

EXAMPLES AND IMPACT ASSESSMENTS

1.

Climate impact assessment of the inner-city master plan (council term 2017–2021)

In connection with the update of the inner-city master plan, a climate impact assessment was carried out on the emissions impact of land use changes, and a climate impact calculation tool based on the Finnish Monitoring System of Spatial Structure (YKR) was developed. With regard to the urban structure, the main emission sectors are energy use in buildings and passenger transport.

A key driver in emissions development is the reduction of specific emissions of district heat as it moves to lower emission energy production. As far as construction is concerned, the most important thing is the energy-efficient renovation of the old building stock, because new construction is rather energy-efficient. Emissions from new construction can be influenced, for example, by material choices. The aim of the master plan guides restructuring, especially in the changing and mixed-function central areas, whose rising land value creates room to manoeuvre for renovation and additional building projects of housing companies and thus also for energy-efficiency improvement measures.

Growth based on sustainable mobility has been made possible by the master plan, especially in the areas of central activities and in the sustainable growth zone made up of centres and public transport corridors, where a blended structure and an efficient public transport system will at best enable a smooth everyday life without a car.

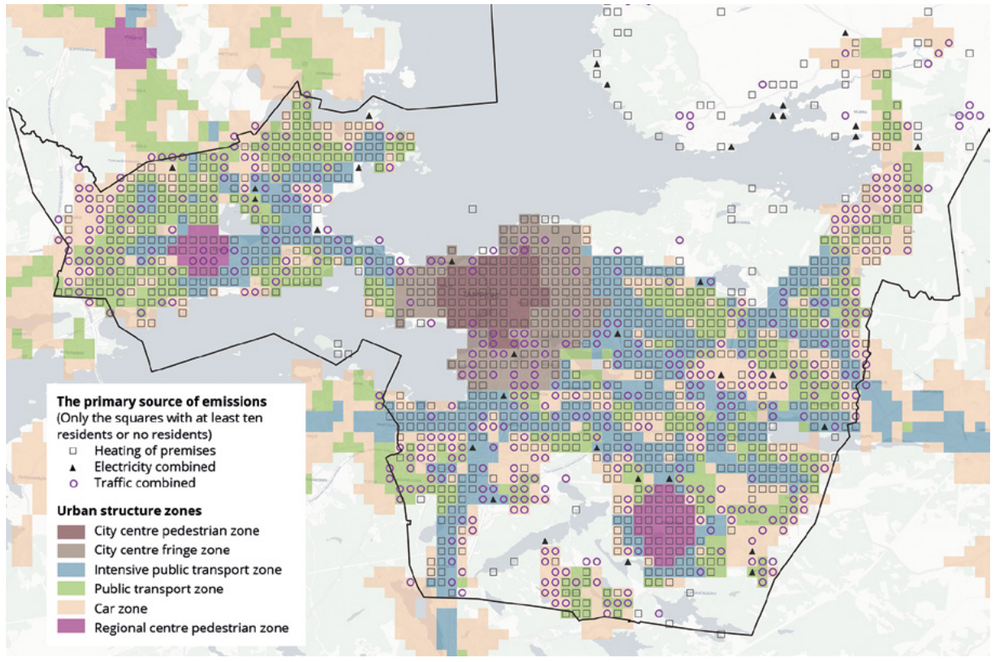


Figure 10: *Largest emission sources by grid and urban structure zones 2019. The impact of the urban structure on emissions is reflected in the climate review of the Tampere inner-city master plan, where the city is divided into grids of 250 square metres. In the city centre, regional centres and the intensive public transport zone, the biggest source of emissions is the heating of premises, while in the car zone traffic is the biggest source. Source: Assessment of the climate impact of the future urban structure. Inner city master plan, council term 2017–2021. ©City of Tampere/Comprehensive Planning 2020.*

Measure package 1.2.	Conditions for sustainable mobility	Timetable in council terms	Responsibility
DESCRIPTION **City growth will be directed to the city centre, regional centres and along the main public transport routes**	7. Planning will focus on the city centre, regional centres and the main public transport routes, i.e. the sustainable growth zone defined in the master plan.	2020–21	Detailed Planning, Comprehensive Planning
	8. New areas and infill development will be planned using the targeted modal share for sustainable mobility for 2030.	2020–25	Transport System Planning Comprehensive Planning, Detailed Planning
The Finland Railway and local train traffic will be promoted	9. The planning of the high-speed rail link between Tampere and Helsinki (Finland Railway) will be actively promoted as part of project company cooperation.	2020–29	Growth, Innovation and Competitiveness Services, Comprehensive Planning, Detailed Planning Public Transport Transport System Planning
The attractiveness of the surrounding environment and the accessibility of services by walking, cycling and public transport will be improved	10. Land use planning will take into account the space reservations of future local train stations in accordance with the inner-city master plan.	2020–25	Comprehensive Planning, Detailed Planning, Public Transport, Transport System Planning
	11. Adequate space reservations for pedestrian and cycling connections, public transport stations and nodes will be ensured in Detailed Planning. The accessibility of public transport stops will be improved through Detailed Planning.	2020–21	Detailed Planning, Public Transport, Transport System Planning
	12. The accessibility of services will be taken into account through sustainable modes of transport in the design of the service network and services. When constructing new operating units, their high accessibility by walking, cycling, public transport and remote connections will be taken into account.	2020–29	Comprehensive Planning, Detailed Planning, Service Network Planning, Real Estate and Housing, Transport System Planning
	13. The attractiveness and quality of the local environment will be improved by developing an urban space manual for regional centres, and the accessibility of local services will be boosted by creating a mixed structure in the centres of the overall sustainable growth zone and in the vicinity of major public transport stops.	2020–21	Transport System Planning Comprehensive Planning, Detailed Planning, Green Areas and Storm Water Management, Construction and Maintenance of Urban Environment
	14. Significant urban road transport projects (e.g. interfaces) will be subject to a climate impact assessment.	2020–30	Transport System Planning
Emission reduction	●●●●○		
Cost estimate	●○○○○		
Other benefits	• Promoting a diverse urban environment • Enabling infill development • Strengthening the profitability of services and public transport		

EXAMPLES AND IMPACT ASSESSMENTS

7.

Sustainable growth zones

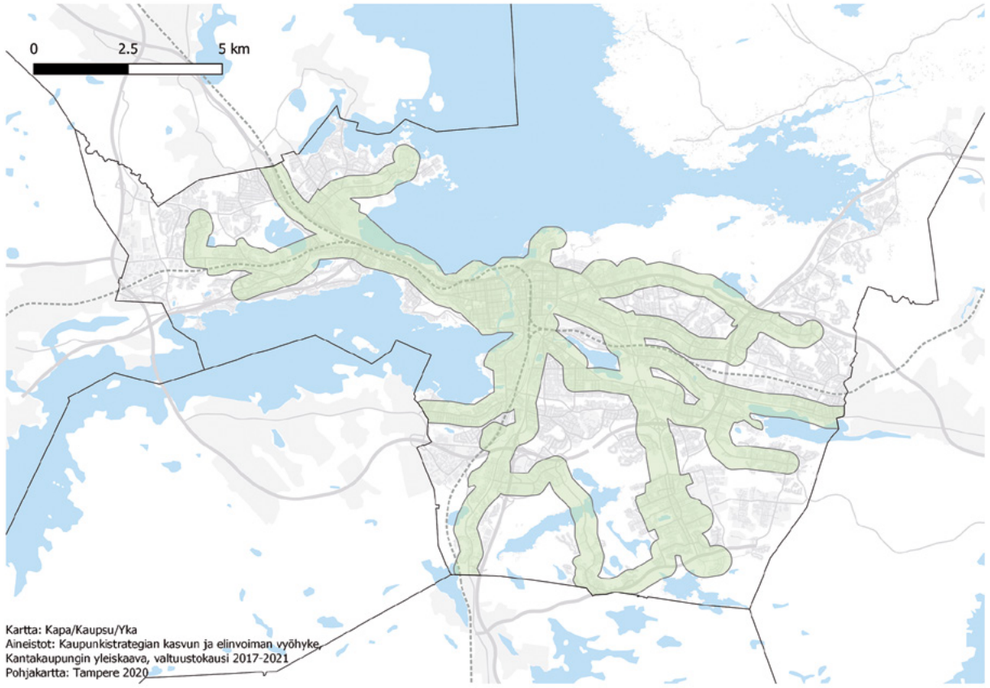


Figure 11: *Zones of growth and vitality of the draft inner-city master plan (council term 2017–2021), to which the aim is to direct 80–90% of the increase in the population of Tampere. ©City of Tampere/Comprehensive Planning 2020.*

	2019–2030	2031–2040
Population increase Share of total growth		
Within the zone	**75%**	**85%**
Outside the zone	**25%**	**15%**
Increase in jobs Share of total growth		
Within the zone	**84%**	**91%**
Outside the zone	**16%**	**9%**

Figure 12: *Increase in the number of inhabitants and jobs within and outside the growth and vitality zone according to the draft inner-city master plan, council term 2017–2021. ©City of Tampere/Comprehensive Planning 2020.*

Measure package 1.3.	Strengthening green belts	Timetable in council terms	Responsibility
DESCRIPTION **Ensuring the integrity and sufficiency of green networks in planning** **A green factor tool will be adopted in Detailed Planning**	15 The role of green spaces as pleasant routes for outdoor exercise and recreation and as pedestrian environments will be strengthened by ensuring the consistency of networks in Detailed Planning and by developing quality guidelines for public spaces.	2020–21	Comprehensive Planning, Detailed Planning, Green Areas and Storm Water Management, Construction and Maintenance of Urban Environment, Transport System Planning Sustainable City
	16. A green factor to be introduced into the appropriate town plans.	2020–21	Detailed Planning, Green Areas and Storm Water Management, Comprehensive Planning
	17. Monitoring of the quality, quantity and accessibility of green belts will be planned and implemented in the city map service.	2020–21	Comprehensive Planning, Green Areas and Storm Water Management
	18. Information will be produced on the economic value of ecosystem services provided by green spaces so that they can be considered in land use planning and ensure the adequacy and integrity of green belts.	2020–21 2021–25	Sustainable City, Comprehensive Planning
Emission reduction	●●○○○		
Cost estimate	●○○○○		
Other benefits	• Securing a carbon-sequestering urban green • Strengthening urban biodiversity • Positive effects on well-being and microclimate, such as mitigation of heat, wind and stormwater flooding		

EXAMPLES AND IMPACT ASSESSMENTS

15

The role of green belts will be strengthened

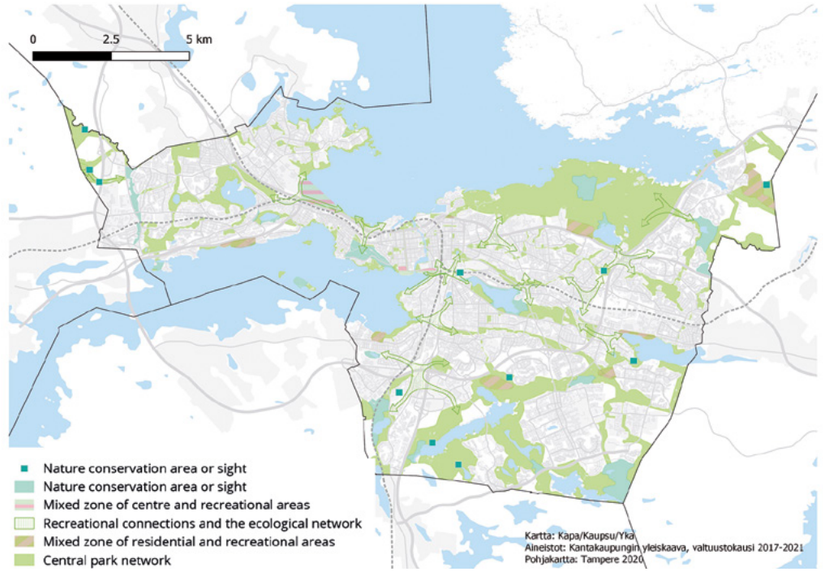


Figure 13: *Green belt networks in the draft inner-city master plan, council term 2017–21. The central objective of the master plan is to ensure the preservation of the values of the central park network and the adequacy and accessibility of recreational areas and services by walking, cycling and public transport. Another aim is also to ensure the continuity of recreational connections and the ecological network, as well as to improve the functionality, attractiveness and safety of recreational connections. The master plan also outlines the delimitation of the national urban park under preparation. ©City of Tampere/ Comprehensive Planning 2020.*

Measure package 1.4.	Five-star city centre	Timetable in council terms	Responsibility
DESCRIPTION **Carbon footprint assessments will be carried out for large development projects in the city centre** **The Tampere station area will be developed as a hub for sustainable mobility, housing and jobs** **Sustainable event venues will be developed in the city centre** **Carbon-neutral infill development will be promoted**	19. A collating socio-economic impact analysis will be conducted for the city centre's development projects. The economic and employment impacts of construction and operation will be modelled at local, regional and national level.	2020–21	Five-star City Centre Development Programme
	20. Carbon footprint calculations will be carried out for major development projects in the city centre (e.g. Uros Live Arena). The calculation method will be developed together with the Sustainable Tampere 2030 programme, possibly taking into account emissions from heat production, electricity production, waste management, mobility and travel with sufficient and necessary accuracy.	2020–21	Five-star City Centre Development Programme, Sustainable City
	21. An energy modelling will be done for the Tammela infill development area.	2020–21	Five-star City Centre Development Programme, Sustainable City
	22. The Tampere station area will be developed into the city's most significant concentration of office jobs and numerous companies, where a large number of apartments and a new type of travel centre will also be built. The condensation of the urban structure of the area, the natural overlap of activities, good public transport connections combined with pedestrian and cycling routes and smooth travel chains will contribute to the carbon-neutrality goal of the City of Tampere.	2020–29	Five-star City Centre Development Programme, Detailed Planning, Transport System Planning Green Areas and Storm Water Management
	23. City venues along good public transport routes in the city centre, such as Ratina Stadium, Uros Live, Tammela Stadium and Särkänniemi, are developed.	2020–29	Five-star City Centre Development Programme
	24. Infill development sites in the city centre will be marketed as part of a communication campaign for housing companies to encourage infill development in 2021.	2020–21	Sustainable City, Five-star City Centre Development Programme, Comprehensive Planning, Detailed Planning, Real Estate and Housing, Ekokumppanit Oy
	25. Smart and sustainable construction will be promoted through design competitions and development projects in areas such as Tammela, Viinikanlahti, the western city centre and the Tampere Deck.	2020–29	Five-star City Centre Development Programme, Sustainable City, Smart Tampere

Emission reduction	●●●○○
Cost estimate	●●●●○
Other benefits	• Promoting a diverse urban environment • Enabling infill development • Strengthening the profitability of services and public transport • Strengthening Tampere's attractiveness

EXAMPLES AND IMPACT ASSESSMENTS

22. New station centre

Figure 14: *Renewal of the station area is the largest single project in the development of the city centre and of national significance, as Tampere is an important railway hub. A railway, tramway and bus transport centre will be built in the station centre area, which will be surrounded by new apartments, offices and services as well as a new central park. The station centre promotes the city's carbon-neutrality goal by streamlining sustainable mobility and creating an energy-efficient, dense urban structure. The aim is to complete the travel centre and the pictured new station tunnel, where travellers can get directly from the tram stop to the train platforms, and the new travel centre by 2026. The first stage also includes the construction of the station park and residential and commercial premises. The cost to the city will be about 50 million euros and the land use income about 38 million euros. Image source: City of Tampere/COBE/Lunden.*

25. New district in Viinikanlahti

Figure 15: *A residential area of about 4,000 inhabitants is being planned for the site of the Viinikanlahti wastewater treatment plant along the tram route and on the shore of Lake Pyhäjärvi. A large new residential area offers an opportunity to implement sustainable development solutions in a versatile manner. The image shows the winning work "Lakes & Roses" of the international design competition. The jury appreciated the good overall approach of urban and landscape architecture and the clarity of the cityscape. Behind a pseudonym, the winner was revealed to be Finnish architecture agency NOAN from Tampere. Image source: City of Tampere/NOAN Architecture Studio.*

Measure package 1.5.	Carbon-negative Hiedanranta	Timetable in council terms	Responsibility
DESCRIPTION **A carbon-negative residential area is being planned for Hiedan-ranta**	26. A carbon footprint assessment/CO_2 emissions calculation will be carried out from the Hiedanranta master plan. The aim is to obtain the Breeam C environmental classification for the area.	2020–21	Hiedanranta Development Programme, Hiedanrannan Kehitys Oy
	27. Sustainability criteria will be drawn up for plot assignment.	2020–21	Hiedanranta Development Programme, Hiedanrannan Kehitys Oy
An energy community for renewable energy is being pursued for Hiedanranta	28. Hiedanranta will be designed with an energy system that enables local production and utilisation of renewable energy. Open bi-directional energy networks will make up the internal balancing of energy production and consumption. The preconditions for energy communities and the internal energy market in the region will be explored and promoted.	2020–21 2021–25	Hiedanranta Development Programme, Hiedanrannan Kehitys Oy, Sustainable City
Hiedan-ranta construction will implement the principles of the circular econ-omy **New ways of sus-tainable mobility will be developed in Hiedanranta**	29. The principles of the circular economy and new business models will be implemented in the construction of Hiedanranta.	2020–29	Hiedanranta Development Pro-gramme, Hiedan-rannan Kehitys Oy, Construction and Maintenance of Urban Environ-ment, Green Areas and Storm Water Management, Sus-tainable City
	30. The utilisation of zero fibre will be investi-gated and the utilisation method decided on the basis of a study.	2020–21	Hiedanranta Development Programme
	31. Sustainable business operations will be ena-bled. Rules will be defined for co-develop-ment with companies and to support the operating conditions of companies in sustain-able business (e.g. urban food production).	2020–21 2021–25	Hiedanranta Development Pro-gramme, Hiedan-rannan Kehitys Oy, Sustainable City, Smart Tampere
	32. Hiedanranta's transport system will be based on the tramway and other ways of sustaina-ble and smart mobility.	2020–29	Hiedanranta Development Pro-gramme, iedan-rannan Kehitys Oy, Transport System Planning Public Transport, Smart Tampere

Emission reduction	●●●○○
Cost estimate	●●●●○
Other benefits	• Denser urban structure • Promoting a diverse urban environment • Strengthening the profitability of services and public transport • Strengthening Tampere's attractiveness • Developing new business

EXAMPLES AND IMPACT ASSESSMENTS

26. – 32.

Carbon-negative Hiedanranta

Tampere's vision is to build Hiedanranta into a city district that "produces more than it consumes". Sustainable forms of mobility, renewable energy solutions, the circular economy and smooth everyday services that improve the quality of life through the use of new digital solutions will be key objectives in construction.

Hiedanranta will be built in cooperation with residents and companies. There are many innovative projects underway in the area, such as the production of carbon-negative district heat as part of a biocarbon plant, a research project on the utilisation of zero fibre sludge, indoor vertical cultivation, testing of composting dry toilets, the development of new energy solutions and a wide range of events for craftsmen and cultural operators.

The aim is to develop Hiedanranta into a neighbourhood with 25,000 inhabitants and 10,000 jobs. Construction there will begin in the coming years and continue until about 2050.

Figure 16: *Conceptual rendering of Hiedanranta's construction plan. The picture shows Hiedanranta centre, where the tram line will run next to the old factory area, the future commercial centre and the central square. Image source: City of Tampere/ NOAN Architecture Studio.*

THEME 2 SUSTAINABLE MOBILITY

Benefit target 2030: The modal share of sustainable modes of transport is 69%

DESCRIPTION	In Tampere, climate emissions from transport are mainly caused by road traffic. Tampere residents make about half of their journeys by car, but the city's future growth cannot rely as heavily on cars. The city's goal is to increase the modal share of sustainable options strongly and to decrease the share of motoring. Sustainable transport modes, public transport, walking and cycling are priorities in the development of sustainable mobility. Increasing the modal share of sustainable modes of transport is a challenging goal which requires sustained and determined action and also the allocation of resources for the development of sustainable mobility to improve conditions for pedestrian and bicycle traffic and public transport. The service level of the Tampere region public transport system will be raised to receive the share of daily urban mobility in line with the targets set. The tramway is the most significant single project in the development of the public transport system, as it reduces the climate load by reducing energy consumption in transport and using electricity instead of oil. In addition, the tramway creates a framework for sustainable land use and promotes smart mobility that develops smooth travel chains and new transport services. The development of a sustainable public transport system also requires a shift to emission-free bus transport and the development of smooth travel chains and new mobility services, as well as an overall improvement in the level of service in order to increase the modal share of public transport in line with the target set. The conditions for pedestrian and bicycle traffic will be improved by streamlining the main cycling routes and by developing walking zones in the city centre and regional centres. The reform of transport pricing is expected to be both the most effective and the most cost-effective measure in terms of reducing emissions from road transport. Halving traffic emissions also requires a renewal of the fleet and an increase in the share of alternative fuel sources. New mobility services, such as car-sharing, demand-responsive transport and city bikes, complement sustainable mobility, reduce the need for ownership and use of private cars, improve the everyday life of residents and facilitate the use of public transport. Mobility management is about encouraging sustainable mobility through, for example, counselling, mobility plans, marketing, and the development and testing of new services. The city, as a big employer, is a trendsetter in this.
Target 2030	• Modal share of public transport: 19% (2025), 21% (2030). • Modal share of walking: 31% (2025), 33% (2030). • Modal share of cycling: 13% (2025), 15% (2030). • Modal share of travel by car: 36% (2025), 30% (2030). • The number of public transport journeys in Tampere will increase by 9% (2021), 22% (2025) and 44% (2030) from 2019 • The increase in car travel output will stop by 2025 and start decreasing despite population growth. • Share of vehicles with alternative fuel source systems in traffic use in Tampere: 5% (2021), 20% (2025), 35% (2030). • Share of cars of the city organisation using alternative fuel sources: 5% (2021), 40% (2025), 100% (2030). • Share of vans of the city organisation using alternative fuel sources: 0% (2021), 20% (2025), 100% (2030). • Amount of outsourced transport services using low emission fuel sources (bus and tramway line kilometres): 5% (2021), 35% (2025), 100% (2030).

Target 2030	• Tampere will operate a comprehensive, diverse, efficient and low-emission public transport system consisting of a tramway, local trains, bus transport and smart travel chains connecting all modes of transport • Walking and cycling will be smooth, attractive and safe modes of transport, separated on their own routes in the city centres and on the main routes. Cycling will be the fastest mode of transport for journeys of under 3km. • Tampere will have created a diverse range of mobility services to complement a sustainable mobility system. The need for ownership and use of a private car will have decreased. • Most journeys to school and commutes by city employees will be made using sustainable modes of travel. • The city and its partners will implement versatile mobility management as part of transport and community planning. The means of mobility management will be linked to other means of promoting sustainable mobility.
Indicators	• Modal share of public transport on an autumn weekday (%) • Modal share of walking on an autumn weekday (%). • Modal share of cycling on an autumn weekday (%). • Modal share of travel by car on an autumn weekday (%) • Amount of outsourced transport services using low emission fuel sources (line km) • Car travel output (km/person) • Share of cars owned by Tampere residents using alternative fuel sources (%) • Share of cars of the city organisation using alternative fuel sources (%) • Share of vans of the city organisation using alternative fuel sources (%)
Starting point	• Tampere Strategy 2030 • Sustainable Tampere 2030 guidelines • Tampere inner-city master plan 2040 • Tampere city centre strategic partial master plan • Tampere region construction plan 2040 • Tampere Tramway Development Programme • Future directions of the tramway in the Tampere city region • Tampere city region local train development programme • Land Use, Housing and Transport Agreement (MAL Agreement) 2020–23 between the State and the municipalities of the Tampere region and the Tampere City Region • Vision and targets of walking and urban life 2030 • Action plan for electronic transport • Tampere parking policy guidelines 2019 • City of Tampere guidelines for personnel • Smart Tampere programme • MaaS Vision 2030 for the Tampere region – a preliminary survey of mobility as a service activities

Situational picture: Realisation of indicators

Indicator	Unit	2012	2016	2018	2019
Mode of public transport on an autumn weekday	%	17	13		
Mode of walking on an autumn weekday	%	27	31		
Mode of cycling on an autumn weekday	%	10	10		
Mode of motoring on an autumn weekday	%	45	44		
Share of cars using alternative fuel sources	%			1	2

EXAMPLES AND IMPACT ASSESSMENTS

Emissions from passenger transport in 2030

Sustainable mobility solutions in Tampere include the development of pedestrian-orientation in city centres, the development of the main cycling routes, the expansion of the tramway in Tampere and regionally, and the allocation of streets with a public transport focus and the development of smooth travel chains.

A climate impact assessment, including the scenario review of the image, was carried out in connection with the preparation of the inner-city master plan, council term 2017–21. It describes annual emissions from passenger transport after projected land use in the target year of carbon neutrality, 2030. The review reveals a clear zonality of urban structure and mobility patterns, which results in low emissions for residents in the city centre compared to the car zone in the periphery of the inner city.

On the other hand, emissions from moving within the well-served public transport zone within the ring road are also relatively high. One of the reasons for this situation is the excellent car accessibility that manifests itself especially around the Nokia motorway, which seems to affect the choice of the transport mode of the residents and employees of the region in a way that impairs sustainable mobility. Particular attention should therefore be paid to the competitiveness of cycling and public transport in this zone in order to achieve the changes in the modal split required by the emission reduction targets.

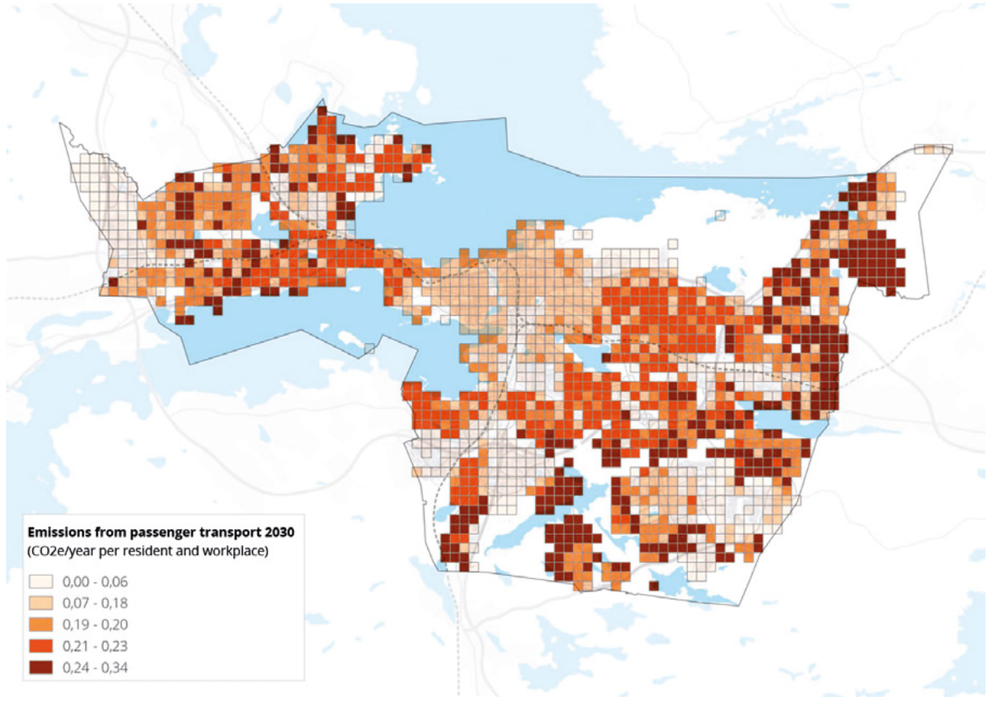


Figure 17: *The map shows the calculated emissions of passenger transport in 2030 by grids of 250 square metres, divided by the sum of the number of inhabitants and the number of jobs on each square metre. Emissions are highest in the car zone of the periphery of the inner city, but also in the vicinity of the ring roads. ©City of Tampere/Comprehensive Planning 2020.*

Figure 18: *The possibilities for sustainable mobility in Tampere will improve significantly in the coming years as tram traffic starts in Tampere in August 2021. Conceptual rendering of the Vieritie stop near Tays Hospital. Image source: City of Tampere.*

Figure 19: *Efforts are being made to make walking and cycling smooth and safe in Tampere, for example by separating pedestrian and bicycle traffic to their own routes in the city centre and raising the quality level of the main regional cycling routes.*
Image source: Visit Tampere Oy/Laura Vanzo.

Measure package 2.1.	Tram transport	Timetable in council terms	Responsibility
DESCRIPTION **Tram transport will start in 2021 between Hervanta–Pyynikintori–Tays** **The tramway will be expanded towards Hatanpää highway and Lentävänniemi** **A regional tramway plan will be drawn up** **Project planning of Pirkkala and Koilliskeskus lines will start**	33. The first section of the tramway (Hervanta–Pyynikintori–Tays) will be completed and start operating in August 2021.	2020–21	Tramway Development Programme, Tramway Alliance, Tampereen Raitiotie Oy
	34. Traffic on the Hatanpää highway tramway section Koskipuisto–Sorin aukio square will start in 2021.	2021–25	Tramway Development Programme, Tramway Alliance, Tampereen Raitiotie Oy
	35. The second section of the tramway (Pyynikintori–Santalahti and Santalahti–Lentävänniemi) will be planned and a decision on construction will be made in October 2020. If the decision is positive, construction of the Pyynikintori–Santalahti section will start in 2021 and the Santalahti–Lentävänniemi section in 2022–23. The second section between Pyynikintori and Santalahti will be completed by 2024 and between Santalahti and Lentävänniemi by 2025.	2021–25	Tramway Development Programme, Tramway Alliance
	36. A regional master plan will be drawn up for the tramway (Kangasala, Pirkkala, Ylöjärvi).	2020–21	Tramway Development Programme
	37. During 2021, Tampere and Pirkkala will start drafting a project plan aimed for implementation and, possibly in 2023, an implementation plan for sections Tays–Koilliskeskus and Tampere bus station–Härmälä–Pirkkala.	2021–25	Tramway development programme, Tampereen Raitiotie Oy
	38. Target timetables for the other tramway lines will be defined during 2020–2023.	2021–25	Tramway Development Programme
	39. A long-term public transport plan will be drawn up and maintained to increase the number of passengers. The plan takes into account the special features required to increase the number of passengers on the tramway.	2020–21 2021–25	Public Transport
	40. Green electricity will be obtained for tram transport.	2020–21	Tampereen Raitiotie Oy
	41. A campaign will be organised in connection with the introduction of the tramway, highlighting the positive climate, environmental and health effects of the tramway and other low-emission transport and sustainable mobility.	2020–21	Tramway Development Programme
Emission reduction	●●●○○		
Cost estimate	●●●●●		

Other benefits	• Increased level of service, cost-effectiveness and modal share of public transport services • Smooth everyday life and an attractive street environment • Reduction in the number of road accidents • Expansion of central functions and denser urban structure • Tampere profiled as a European rail city • Total economy, economic benefits of denser land use

EXAMPLES AND IMPACT ASSESSMENTS

33. - 35., 40.

Cost estimate: Tram transport

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 33	9,600	0	9,600
Measure 34	0	38,900	38,900
Measure 35	84,800	0	84,800
Measure 40	0	70	70
Total	**94,400**	**38,970**	**133,370**

Net present value of the programming period

EUR 51,000,000

Figure 20: *Investments in tram transport and operating expenses during the programming period. In addition, the discounted net present value of the measures for the programming period is presented. The cost estimate takes into account the completion of the first section of the tramway, including the construction of the Hatanpää highway branch (measure 33), the operating costs of the first section of the tramway (measure 34), the construction of the second section of the tramway (measure 35) and the estimated additional costs of using green electricity (measure 40). No cost estimates are yet available for the extension sections of the tramway. Government support for the planning and construction of the tramway will be 30% under the MAL4 agreement on land use, housing and transport, which has not been taken into account in the cost estimate. The cost estimates are based on data from the City of Tampere's Tramway Development Programme, the Public Transport Unit and Raitiotie Oy.*

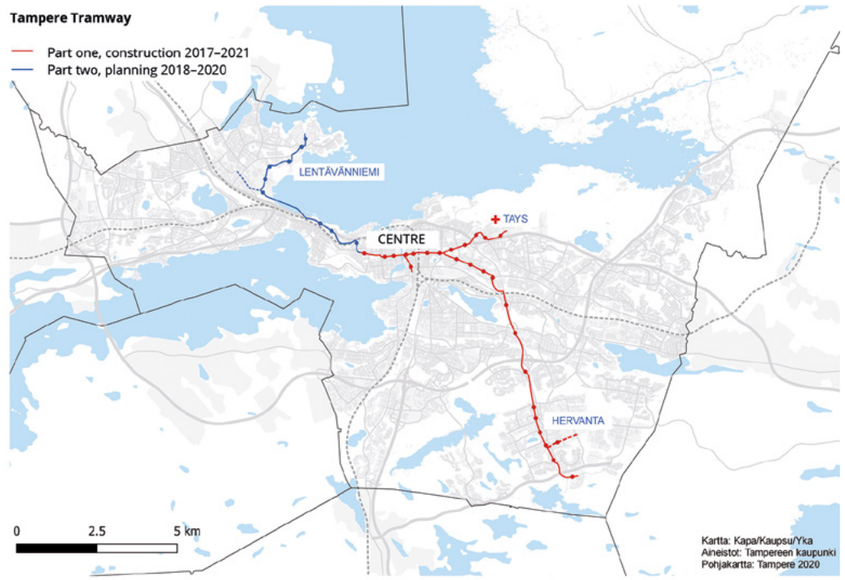


Figure 21: *The operation of the first section of the tramway will start in August 2021, and the planned completion time of the second part is 2024–25. Image source: City of Tampere.*

Measure package 2.2.	Local train transport	Timetable in council terms	Responsibility
DESCRIPTION **Participation in a pilot run for local train services** **Establish a regional master plan for local train services**	42. The local-train traffic will be expanded within the framework of the existing railway infrastructure by participating in the Nokia–Tesoma–Tampere–Orivesi–Lempäälä local train pilot (Ministry of Transport and Communications, regional local train pilot).	2020–21	Public Transport
	43. The Tesoma local train halt will be built.	2020–21	Construction and Maintenance of Urban Environment
	44. A plan and a decision will be made on the continuation of local train services on the basis of the pilot. The city aims to increase local train transport in cooperation with the Ministry of Transport and Communications and the municipalities of the region. If this goal is achieved, traffic will be increased, for example, in the direction of Hankkio, and the Hankkio and Messukylä stops will be constructed.	2021–25 2025–29	Public Transport, Transport System Planning
	45. A regional master plan for local train transport in the Tampere region will be contributed to.	2020–21	Public Transport, Transport System Planning
	46. Common ticketing products for bus and train services will be developed.	2020–21	Public Transport
Emission reduction	●●●○○		
Cost estimate	●●●○○		
Other benefits	• Decreased use of private cars • Improvement of air quality • Reduction of noise pollution • Improvements in public transport service levels and cost-efficiency • Denser urban structure		

EXAMPLES AND IMPACT ASSESSMENTS

44. Expansion of local train transport

Figure 22: *Tampere is preparing for future increases in local train traffic by allocating in Comprehensive Planning halts and stations to local train transport. Image of the draft inner-city master plan, council term 2017–21.*
©City of Tampere/Comprehensive Planning 2020.

44. – 46. Cost estimate: Local train transport

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 44 (local train halts)	5,000	0	5,000
Measure 44 (operation)	0	1,200	1,200
Measure 45	0	50	50
Measure 46	0	400	400
Total	**5,000**	**1,650**	**6,650**

Net present value of the programming period
EUR 1,800,000

Figure 23: *Projected investments in local-train transport and operating expenses during the programming period. In addition, the discounted net present value of the measures for the programming period is presented. The costs of increasing the number of local-train transport (measure 44) will depend on the organisational model and only costs from year 2021 have been taken into account for the regional master plan for local-train transport (measure 45). Substantial government support is available for local-train halts under the MAL4 agreement on land use, housing and transport. The support has not been taken into account in the presented cost estimate. The cost estimates are based on the calculations and expert estimates of the City of Tampere Public Transport Unit and are indicative.*

Measure package 2.3.	Bus transport	Timetable in council terms	Responsibility
DESCRIPTION **By 2030, bus transport will move completely to alternative fuel source systems**	47. Tendering models will be developed to support climate targets.	2020–21 2021–25	Public Transport
	48. The production agreement of Tampere City Transport (TKL) will be amended to support the climate targets.	2020–21 2021–25	Public Transport, Tampere City Transport
	49. On the basis of a an assessment on fuel sources, guidelines will be drawn up for the conversion of bus traffic to low emission by 2030 (both TKL's own fleet and private ones). The guidelines will be issued in 2020. The guidelines will also help prepare for the implementation of the EU Directive. According to the directive, at least 20.5% of the traffic that starts between 2022 and 2026 must run on electricity and 20.5% on other alternative fuels. At least 29.5% of the traffic that starts between 2027 and 2030 must run on electricity and 29.5% on other alternative fuels.	2020–29	Public Transport, Tampere City Transport
	50. A new depot will be built for TKL buses, designed for the needs of new fuel sources.	2021–25	Public Transport, Tampere City Transport
	51. Methods will be developed for route planning for electric buses. A pilot will confirm the possibilities of profiling public transport routes to reduce public transport costs and emissions.	2020–21	Smart Tampere, Tampere City Transport, public transport
Emission reduction	●●●●○		
Cost estimate	●●●●○		
Other benefits	• Decreased noise levels of public transport • Reduction of harmful local emissions • Improvement of the image of bus transport and fleet renewal		

EXAMPLES AND IMPACT ASSESSMENTS

48., 50.

Cost estimate: Bus transport

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 48	0	1,000	1,000
Measure 50	14,000	0	14,000
Total	**14,000**	**1,000**	**15,000**

Net present value of the programming period

EUR 4,000,000

Figure 24: *Bus transport investments and operating expenses during the programming period. In addition, the discounted net present value of the measures for the programming period is presented. The modification of the TKL production agreement to support the climate target (measure 48) and the construction of a new depot (measure 50) have been taken into account in the cost estimate. The cost estimates are based on the estimates of the City of Tampere's Public Transport Unit and the information provided in the City's investment plan.*

49.

Estimated emissions and costs: Change in the fuel sources of buses

In addition to the current development and the Sustainable Tampere 2030 development, the situation regarding the fuel source change of the city buses will be examined in the light of the EU Directive and subsequent development in national legislation (EU scenario). In addition, the situation is examined under optimistic and pessimistic assumptions, as there are still lots of uncertainties surrounding the development of the situation. Under the pessimistic assumption, the charging of electric buses creates a need for longer terminal time and thus for an additional bus for each line to be operated. Under the optimistic assumption, the need for an additional bus caused by the charging of electric buses is removed. The cost analysis has been prepared in the Public Transport and Sustainable Development units of the City of Tampere. When interpreting the results, it must be taken into consideration that the costs include services using the TKL's own fleet and those purchased from private operators. The analysis covers all Nysse traffic instead of only bus traffic in the Tampere region. Investments and operating expenses are not separated in the analysis, but are presented as a whole.

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	Bus transport is expected to remain as it is at present, i.e. there will be no increase in alternative fuel sources in own fleet or in bus services purchased from other operators.
EU scenario	The city is expected to transform its own fleet and bus services purchased from other operators into cleaner fuel sources in line with the requirements of the EU Clean Vehicles Directive. This would mean that 20.5% of the traffic that starts between 2022 and 2026 would have to be operated on electricity and another 20.5% on electricity or other alternative fuels. Of traffic starting between 2027 and 2030, 29.5% will have to be operated on electricity and another 29.5% on electricity or other alternative fuels. Renewable diesel has been used as an alternative fuel for this calculation.
KT2030 scenario	In 2030, 50% of bus traffic will be powered by electricity, 40% by renewable diesel and 10% by biogas.

RESULTS OF THE REVIEW OF EU SCENARIO COMPARED TO CURRENT DEVELOPMENT:

EU scenario	Result
Cost impact in the programming period	Pessimistic assumption: The net present value of the programming period is EUR 3.4 million, which means that a change in fuel sources would entail this much additional cost compared to current development. Optimistic assumption: The net present value of the programming period is EUR -0.8 million, which means that a change in fuel sources would result in cost savings of EUR 0.8 million compared to current development. The measure is therefore financially viable. Conclusion: Switching to cleaner fuel sources in line with the requirements of the EU Directive could even lead to cost savings for the city in terms of low operating costs if no additional bus is needed and electric buses grow moderately cheaper. If the requirement for an additional bus were not eliminated, compliance with the requirements of the directive would entail additional costs to the city. Government support for electric buses is available under the MAL4 agreement on land use, housing and transport.
Emissions reduction in 2030	11,000 tCO_2e
Cost of emission reduction	Pessimistic assumption: EUR 60 per tCO_2e Optimistic assumption: EUR -10 per tCO_2e

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> Estimated emissions and costs: Change in the fuel sources of buses (continued from previous page)

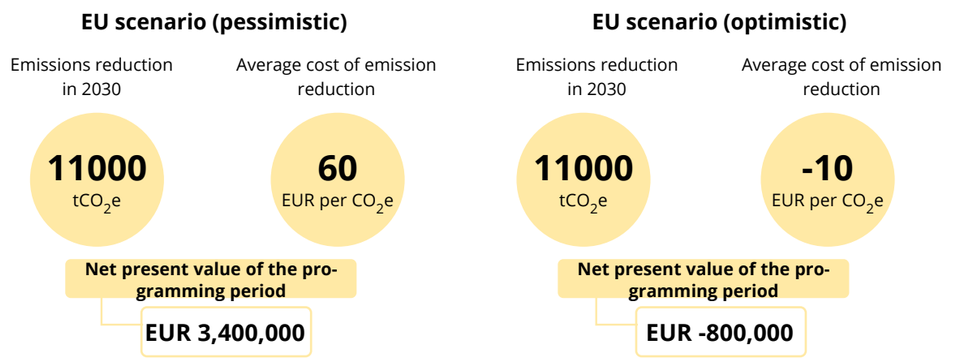

Figure 25: *Emission reduction of bus fuel source change in 2030 (tCO_2e) in line with EU scenario and average emission reduction prices (EUR per tCO_2e) in a pessimistic and optimistic assumption compared to current development. In addition, discounted net present values for the programming period are presented.*

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	Pessimistic assumption: The net present value of the programming period is EUR 3.3 million, which means that a change in fuel sources would entail this much additional cost compared to current development. Optimistic assumption: The net present value of the programming period is EUR -3.7 million, which means that a change in fuel sources would result in cost savings of EUR 3.7 million compared to current development. The measure is therefore financially viable. Conclusion: The shift to cleaner fuel sources in line with the KT2030 scenario could lead to cost savings for the city due to low operating costs, if no additional bus is needed and electric buses grew moderately cheaper. If the requirement for an additional bus could not be eliminated, the KT2030 scenario would entail additional costs for the city. Government support for electric buses is available under the MAL4 agreement on land use, housing and transport.
Emissions reduction in 2030	24,600 tCO_2e
Cost of emission reduction	Pessimistic assumption: EUR 30 per tCO_2e Optimistic assumption: EUR -30 per tCO_2e

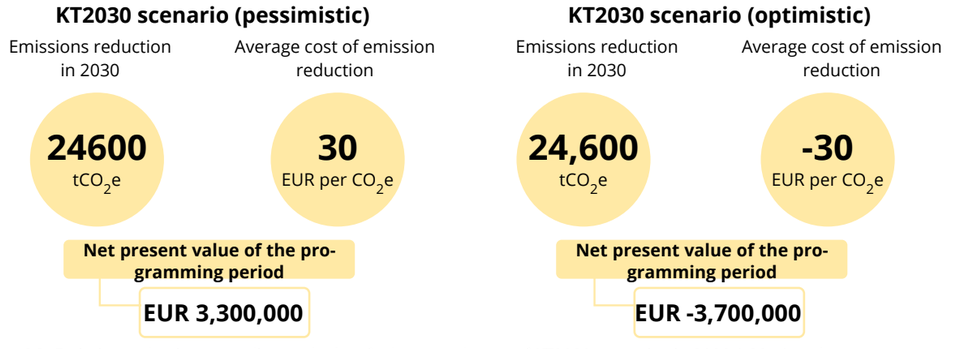

Figure 26: *Emission reduction according to the bus fuel source change of KT2030 scenarios in 2030 (tCO_2e) and average emission reduction prices (EUR per tCO_2e) in an optimistic and pessimistic assumption compared to current development. In addition, discounted net present values for the programming period are presented.*

Figure 27: *Tampere has sought experiences with electric buses with four fully electric buses running on line 2. The aim is to switch to completely clean fuel sources in bus transport by 2030. Image source: City of Tampere/Public Transport.*

Measure package 2.4.	Level of service in public transport	Timetable in council terms	Responsibility
DESCRIPTION **A high frequency of service and quick journey times are ensured on the public transport trunk lines** **Demand-responsive public transport will be developed for areas of low demand** **Public transport will be developed to be competitive with private car use**	52. Sufficient frequency of service on the trunk lines will be ensured (high frequency of service + sufficient number of seats).	2020–29	Public Transport
	53. Speeding up journey times on the trunk lines with proof-of-payment, street arrangements and traffic light priorities.	2020–29	Public Transport, Transport System Planning
	54. Extension of the trunk lines to include additional connectivity.	2020–29	Public Transport
	55. Demand-responsive public transport for areas of low demand.	2025–29	Public Transport
	56. The quality of public transport will be improved by improving customer experience, developing real-time communication for customers and in-house.	2020–21 2021–25	Public Transport
	57. Tariff policy will be developed so that the public transport ticket system is affordable, easy to use, flexible, engages people to use public transport and competitive in terms of price/quality ratio compared to passenger transport.	2020–29	Public Transport
	58. The new payment system will enable new payment methods and smart service packages to increase the number of passengers and provide better information on customer behaviour.	2020–21	Public Transport
	59. Open data and interfaces enable smart information, payment and usage applications.	2020–29	Public Transport, Smart Tampere
Emission reduction	●●●●○		
Cost estimate	●●●●○		
Other benefits	• Improving the fluency and attractiveness of public transport • Improving the competitiveness of public transport • Enabling new mobility services		

EXAMPLES AND IMPACT ASSESSMENTS

52. – 59.

Cost estimate: Public transport service level

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 52	0	5,000	5,000
Measure 53	0	7,500	7,500
Measure 54	0	1,000	1,000
Measures 55 and 56	0	3,000	3,000
Measure 57	0	8,700	8,700
Measures 58 and 59	0	1200	1200
Total	**0**	**26,400**	**26,400**

Net present value of the programming period

EUR 22,200,000

Figure 28: *Operating expenses for improving the public transport service level during the programming period. The discounted net present value of the measures is also presented. The cost estimates are based on the calculations and expert estimates of the City of Tampere's Public Transport Unit and describe the need for additional costs in developing the public transport service.*

Measure package 2.5.	Pedestrian and bicycle traffic	Timetable in council terms	Responsibility
DESCRIPTION **The city centre and regional centres will be developed into pedestrian-oriented slow zones** **Bicycle traffic is separated from pedestrian traffic in slow zones and on main cycling routes** **Main cycling route quality level will be improved and the network will be supplemented.** **The city centre will get high-quality bicycle parking facilities**	60. An urban walking and cycling development programme 2.0 will be prepared in cooperation. The programme addresses the needs for developing the network, maintenance and monitoring, and defines the measures.	2021–25	Transport System Planning
	61. The city centre and regional centres will be developed to be pedestrian-oriented by implementing slow zones, pedestrian streets and pedestrian-oriented streets, where bicycle traffic is always separated from pedestrian traffic, either on its own route or on a roadway. In slow zones, more space is provided for pedestrians and cyclists during roadworks and accessibility is improved.	2020–29	Transport System Planning
	62. The quality level of all regional and other main cycling routes from municipal and regional centres to Tampere city centre will be improved, for example by separating pedestrian and bicycle traffic, scaling the routes according to the forecast number of users, developing guidance and increasing traffic light priorities for sustainable modes of transport.	2020–29	Transport System Planning
	63. The pedestrian and bicycle network will be supplemented by adding missing underpasses and connections. More room is provided for pedestrians and cyclists during roadworks compared to the current situation and accessibility is improved.	2020–29	Transport System Planning
	64. Bicycle parking opportunities will be increased by building a high-quality and safe bicycle parking facility in the city centre, taking into account the needs of different types of bicycles, including cargo bikes and electric bike charging opportunities. The implementation of centralised bicycle parking facilities will be promoted in the city centre, for example as the land use at Keskustori and at the railway station develops.	2021–25 2025–29	Five-star City Centre Development Programme, Transport System Planning
	65. The numbers of high-quality public bicycle parking spaces will be increased in city centres, along cycling routes and at public transport stops and near schools, sports venues and other public spaces.	2020–29	Transport System Planning
	66. The level of winter maintenance will be enhanced on the main cycling routes and on the pedestrian routes of city centres and regional centres by introducing new maintenance methods and developing cooperation through pilots.	2021–29	Construction and Maintenance of Urban Environment, Tampereen Infra Oy
	67. The current possibilities and commercial applications of the re-use of anti-skid gravel will be investigated. Promising methods will be tested.	2020–29	Construction and Maintenance of Urban Environment, Tampereen Infra Oy
	68. Bicycle parking at the city's service buildings will be improved in accordance with Tampere's parking policy in connection with renovations: in offices 1 bicycle parking space per 100 m², in comprehensive school 2 bicycle parking spaces per 3 pupils, frame-lock racks and at least 30% of the spaces are covered. These instructions will be recorded in the design manual.	2020–21 2021–25	Real Estate and Housing, Tampereen Tilapalvelut Oy
Emission reduction	●●●○○		
Cost estimate	●●●●○		
Other benefits	• Health benefits of walking and cycling • Improvement of air quality • Reduction of noise pollution • Increased well-being • Financial benefits to consumers		

EXAMPLES AND IMPACT ASSESSMENTS

61. - 66., 68.

Cost estimate: Improving conditions for pedestrian and bicycle traffic

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 61	9,000	0	9,000
Measure 62	25,500	0	25,500
Measure 63	18,000	0	18,000
Measure 64	4,500	0	4,500
Measure 65	1,000	0	1,000
Measure 66	0	1,000	1,000
Measure 68	2,400	0	2,400
Total	**60,400**	**1,000**	**61,400**

Net present value of the programming period

EUR 14,200,000

Figure 29: *Investment and operating expenses for pedestrian and bicycle traffic during the programming period. In addition, the discounted net present value of the measures for the programming period is presented. The cost estimates are based on the calculations of the City of Tampere Transport System Planning Unit and expert estimates, and describe the need for off-budget additional funding. The costs of a walking and cycling network built in new areas have not been taken into account. Government support for the promotion of pedestrian and bicycle traffic is available under the MAL4 agreement on land use, housing and transport. The support has not been taken into account in the cost estimate.*

Measure package 2.6.	Road transport	Timetable in council terms	Responsibility
DESCRIPTION **Increased use of electric cars will be facilitated by promoting the expansion of the charging network** **The conditions for the implementation of a low-emission traffic zone and road tolls in the city centre will be investigated** **Low-emission vehicles will receive parking fee reductions** **Increased use of distribution and urban logistics will be promoted** **The city's transport equipment and work machines to use sustainable fuel sources**	69. It will be defined how market-based expansion of the electric car charging network and development of the gas filling station network will be facilitated.	2020–21	Transport System Planning, Comprehensive Planning
	70. Options for the implementation of a possible low-emission zone in the city centre and its climate and other impacts (e.g. noise and air quality) will be investigated.	2021–25	Transport System Planning, Sustainable City
	71. Electric car charging stations will be added to city properties in accordance with the Energy efficiency act and the Act on electric vehicle charging points, which will enter into force in 2021.	2021–25	Real Estate and Housing
	72. The effects and feasibility of congestion charges will be investigated as part of the preparation of the relevant government legislation. The impact of the introduction of congestion charges in the Tampere city region will be assessed in connection with the preparation work. Decisions on the possible introduction of congestion charges will be taken separately.	2021–25	Transport System Planning
	73. Parking policy will be developed and parking standards updated to support sustainable mobility. Parking tariffs will be reformed to provide a fee reduction for low-emission vehicles.	2021–25	Transport System Planning
	74. The freed-up space along streets will be used to improve the conditions for sustainable modes of transport, as parking is moved to multistorey car parks in city centres.	2020–29	Transport System Planning
	75. The Smart Parking concept will be developed and its introduction promoted, for example In Tammela and elsewhere in city-centre parking.	2020–29	Five-star City Centre, Smart Tampere, Finnpark Oy
	76. A plan for sustainable urban logistics will be prepared. There will be active development of urban logistics in cooperation with key stakeholders in the sector and development of incentives to increase low-emission delivery, including in urban transport.	2020–21	Transport System Planning
	77. Opportunities for sustainable delivery will be improved, for example by means of drones, cargo bikes and light electric vehicles. The electrification of delivery traffic will be promoted by building charging points for heavy vehicles.	2021–25 2025–29	Transport System Planning Smart Tampere
	78. The optimisation of routes and the centralisation of transport in the city's freight and passenger logistics will be improved further. The need for vehicles in freight and passenger logistics will be reduced through more efficient combining of material flows. Joint tendering for transport services will be carried out in library and museum services, as appropriate, and ecology will be introduced as one of the evaluation criteria	2021–25	Tuomi Logistiikka Oy, Culture and Leisure Services
	79. A gradual procurement plan will be established to increase sustainable fuel sources (electricity, biogas, renewable diesel) in the city's cars. The aim is for all cars to run on low-emission fuel sources by 2030. At the same time, preparations will be made for the implementation of the EU directive on clean fuel sources.	2021–29	Tampereen Infra Oy, Tuomi Logistiikka Oy
	80. A gradual procurement plan will be prepared to increase sustainable fuel sources (electricity, biogas, renewable diesel) in city vans. The aim is for all vans to run on low-emission fuel sources by 2030. At the same time, preparations will be made for the implementation of the EU directive on clean fuel sources.	2021–29	Tampereen Infra Oy, Tuomi Logistiikka Oy
Emission reduction	●●●●○		
Cost estimate	●●●○○		
Other benefits	• Improvement of air quality • Reduction of noise pollution • More efficient use of urban space • Financial savings		

EXAMPLES AND IMPACT ASSESSMENTS

69. - 73., 76.

Cost estimate: Road transport

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measures 69, 70, 72, 76	0	160	160
Measure 71	750	0	750
Measure 73	0	-1,000	-1,000
Total	**750**	**-840**	**-90**

Net present value of the programming period

EUR -400,000

Figure 30: *Investments in road transport and operating expenses during the programming period. In addition, the discounted net present value of the measures for the programming period is presented. The measures will result in cost savings of EUR 840,000 over the programming period. The cost estimates are based on the estimates of the City of Tampere Transport System Planning Unit, the Real Estate and Housing service group and Tampereen Tilapalvelut Oy.*

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79.

Estimated emissions and costs: Shifting the city's cars to low-emission fuel sources

In addition to current development and Sustainable Tampere 2030 development, the situation regarding the fuel source change of the city's cars will be examined in the light of the EU Directive and subsequent development in national legislation. In the calculations, cars have been treated as investments, even though some vehicles are obtained under a leasing contract. However, the calculation gives a sufficiently precise picture, as the focus of the analysis is on the cost difference between the different modes of operation, and it is realised in the same way both in leasing procurement and in investments acquired to own. The investment costs of the charging stations are not included in the calculation. The cost analysis has been prepared by the City of Tampere Sustainable Development Unit.

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	The city's cars are assumed to remain as they are today, i.e. there will be no increase in alternative fuel source.
EU scenario	The city is expected to change its cars to cleaner fuel source in line with the requirements of the EU Clean Vehicles Directive. This would mean that from 2021 onwards 38.5% of new vehicles purchased would have to use "clean" propulsion, which, according to more specific regulations for cars, means in practice only fully electric cars. With this development, by 2030, 48% of all of the city's cars would be electric cars.
KT2030 scenario	The number of cars using different propulsions will increase over the fuel source period, so that by 2025 30% of cars will be electric and 10% gas powered. In 2030, 70% of all cars will run on electricity and the remaining 30% on biogas. It should be noted that biogas does not meet the requirements of the Directive, but its use nevertheless contributes to the city's own goal of carbon neutrality.

RESULTS OF THE REVIEW OF EU SCENARIO COMPARED TO CURRENT DEVELOPMENT:

EU scenario	Result
Cost impact in the programming period	The additional cost of the change in fuel source for the programming period is EUR 240,000. Taking into account the life cycle of the investments, and when they are only partially evaluated for the programming period, the net present value of the measure is EUR -20,000. The measure is therefore financially viable.
Emissions reduction in 2030	200 tCO_2e
Cost of emission reduction	EUR -20 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 79 (EU scenario, cars)	950	-710	240
Total	**950**	**-710**	**240**

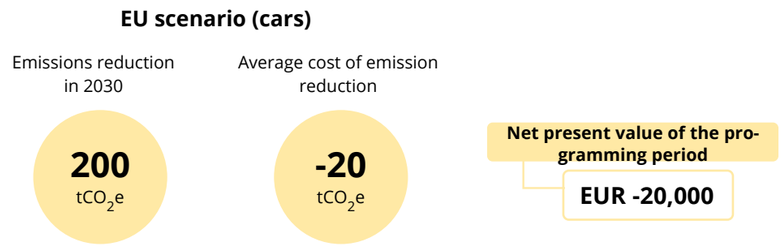


Figure 31: *Investments and operating expenses of the change in fuel sources of cars according to the EU scenario during the programming period, emission reductions in 2030 (tCO_2e) and average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented*

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	The additional cost of the change in fuel sources for the programming period is EUR 370,000. Taking into account the life cycle of the investments, and when they are only partially evaluated for the programming period, the net present value of the measure is EUR -100,000. The measure is therefore financially viable.
Emissions reduction in 2030	420 tCO_2e
Cost of emission reduction	EUR -50 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 79 (KT2030 scenario, cars)	1,480	-1,110	370
Total	**1,480**	**-1,110**	**370**

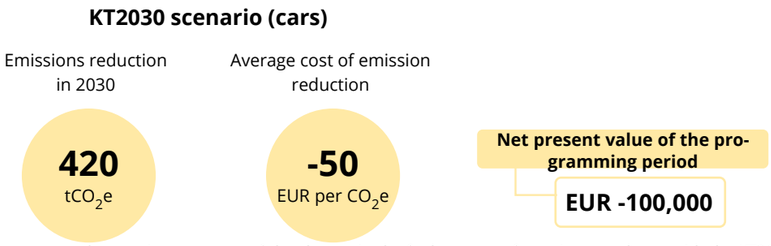


Figure 32: *Investments and operating expenses of the change in the fuel sources of cars in accordance with the KT2030 scenario during the programming period, emission reductions in 2030 (tCO_2e) and the average cost of emission reductions (EUR per tCO_2e) compared to current development. In addition, the discounted net present value of the measure, in which the investments have been evaluated for the programming period, is presented.*

80.

Estimated emissions and costs: Changing city vans to low-emission fuel sources

In addition to current development and the Sustainable Tampere 2030 development, the situation regarding the fuel source change of the city's vans will be examined in the light of the EU Directive and subsequent development in national legislation. In the calculations, vans have been treated as investments, even though some of the vehicles are obtained under a leasing contract. However, the calculation gives a sufficiently precise picture, as the focus of the analysis is on the cost difference between the different modes of operation, and it is realised in the same way both in leasing procurement and in investments acquired to own. The investment costs of the charging stations are not included in the calculation. The cost analysis has been prepared by the City of Tampere Sustainable Development Unit.

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	The city's vans are assumed to remain as they are today, i.e. there will be no increase in alternative fuel sources.
EU scenario	The city is expected to change its vans to cleaner fuel sources, in line with the requirements of the EU Clean Vehicles Directive. This would mean that from 2021 onwards 38.5% of new vehicles purchased would have to be "clean" fuel sources, which, according to more specific regulations for vans, means in practice only fully electric vehicles. With this development, by 2030 approximately 38% of the city's vans would be fully electric vehicles.
KT2030 scenario	The number of vans using different fuel sources is expected to increase over the programming period, with 10% of vans electric and 10% gas-powered by 2025. In 2030, 75% of all vans will run on electricity and the remaining 25% on biogas. It should be noted that biogas does not meet the requirements of the Directive, but its use nevertheless contributes to the city's own goal of carbon neutrality.

Continues on next page >

RESULTS OF THE REVIEW OF EU SCENARIO COMPARED TO CURRENT DEVELOPMENT:

EU scenario	Result
Cost impact in the programming period	The additional cost of the change in fuel sources for the programming period is EUR 200,000. Taking into account the life cycle of the investments, and when they are only partially evaluated for the programming period, the net present value of the measure is EUR -140,000. The measure is therefore financially viable.
Emissions reduction in 2030	280 tCO_2e
Cost of emission reduction	EUR -90 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 80 (EU scenario, vans)	1,000	-800	200
Total	**1,000**	**-800**	**200**

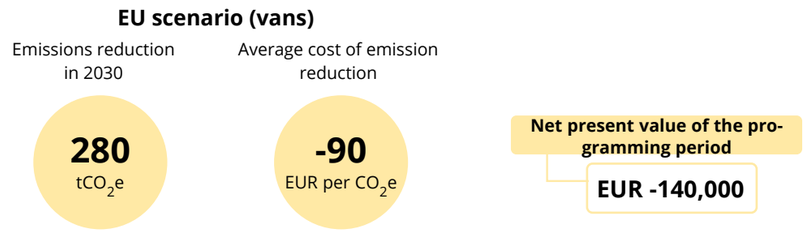


Figure 33: *Investments and operating expenses of the change in the fuel sources of vans according to the EU scenario during the programming period, emission reductions in 2030 (tCO_2e) and average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented.*

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	Cost savings from the change in fuel sources for the programming period amount to EUR 290,000. Taking into account the life cycle of the investments, and when they are only partially evaluated for the programming period, the net present value of the measure is EUR -140,000. The measure is therefore financially viable.
Emissions reduction in 2030	730 tCO_2e
Cost of emission reduction	EUR -50 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 80 (KT2030 scenario, vans)	3,400	-1,300	2,100
Total	**3,400**	**-1,300**	**2,100**

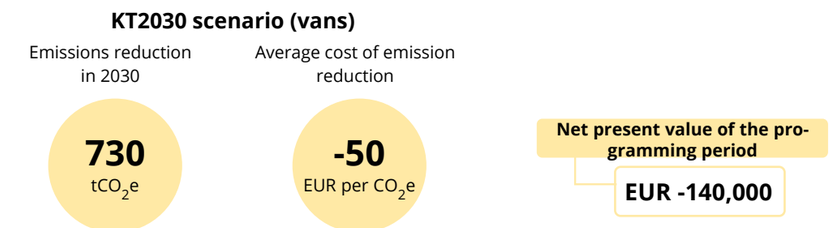


Figure 34: *Investments and operating expenses of the change in the fuel sources of vans in accordance with the KT2030 scenario during the programming period, emission reductions in 2030 (tCO_2e) and the average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented.*

Figure 35: *The charging opportunities of electric cars will increase in Tampere, as the city companies Tampereen Sähkölaitos Oy and Finnpark Oy build charging stations on market terms. Finnpark will build them in its parking facilities, and Sähkölaitos has a service package for companies and buildings, where they can receive both the construction and use of charging stations in return for a service fee, thus avoiding their own investments in charging infrastructure. Image source: Tampereen Sähkölaitos Oy.*

Measure package 2.7.	Transport equipment and work machines	Timetable in council terms	Responsibility
DESCRIPTION **The city's transport equipment and work machines will switch to sustainable fuel sources**	81. When tendering for the city's transport equipment and work machines, a market survey will be carried out of the possibilities for increasing the use of alternative fuel sources. The market survey will also be used to find out the minimum requirements for purchases, such as fuel consumption per car and/or economical driving.	2021–25	Construction and Maintenance of Urban Environment, Tampereen Infra Oy
	82. In the case of equipment purchases, the minimum requirement for the emission class in 2020 will be: • EURO V standard for emissions of carbon monoxide, hydrocarbons, nitrogen oxides and fine particulates from lorries (2010) • Stage III B standard for emissions of carbon monoxide, hydrocarbons, nitrogen oxides and fine particulates from work machines (year of introduction 2012)	2020–21	Construction and Maintenance of Urban Environment, Tampereen Infra Oy
	83. A procurement plan will be drawn up to increase the use of sustainable fuel sources (electricity, biogas, renewable diesel) in the city's transport fleet and work machines and in works contracts. The aim is that all transport fleet and work machines will run on low-emission fuel sources by 2030.	2020–29	Construction and Maintenance of Urban Environment, Tampereen Infra Oy
Emission reduction	●●●○○		
Cost estimate	●●○○○		
Other benefits	• Improvement of air quality • Health benefits • Improved quality of equipment		

EXAMPLES AND IMPACT ASSESSMENTS

83.

Estimated emissions and costs: Use of renewable diesel in work machines

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	The city's own work machines will continue to use only diesel, and its consumption is expected to remain at its current level until 2030.
KT2030 scenario	The city's own work machines will linearly switch to renewable diesel, so that it will be used exclusively by 2030.

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	The additional cost of using renewable diesel in the city's own work machines during the programming period is EUR 280,000. The discounted net present value of the measure for the programming period is EUR 250,000.
Emissions reduction in 2030	2,100 tCO_2e
Cost of emission reduction	EUR 20 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 83	0	280	280
Total	**0**	**280**	**280**

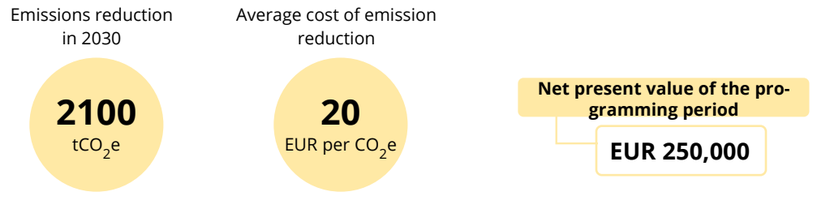


Figure 36: *Operating expenses of the switch to renewable diesel in accordance with the KT2030 scenario during the programming period, emission reductions in 2030 (tCO_2e) and the average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented.*

Measure package 2.8.	New mobility services	Timetable in council terms	Responsibility
DESCRIPTION **City bikes will be introduced in 2021** **Autonomous transport will be developed as part of public transport travel chains** **Services will be increased in key public transport nodes** **Increased use of car-sharing services will be promoted** **Availability of biofuels and electricity charging stations will be improved in ports**	84. The city bike system will be developed as part of the first and last mile solution for public transport, i.e. the transition to and from the public transport stop to the destination of the journey. Docking city bikes will start operating in 2021.	2020–21	Transport System Planning Public Transport
	85. Autonomous transport, such as robot buses and demand-responsive autonomous vehicles, will be developed as part of first and last mile public transport services.	2021–25	Public Transport, Transport System Planning Smart Tampere
	86. The smooth functioning of public transport hubs and service provision will be improved, for example through pedestrian and cycling connections to public transport stops, travel terminals, guidance boards, smart applications and cooperation with commercial service providers. A plan will be prepared for the development of park-and-ride facilities. The provision of maintenance and rental services and other cycling services will be facilitated in connection with bicycle parking and at transport hubs, for instance.	2020–29	Detailed Planning, Public Transport, Construction and Maintenance of Urban Environment, Transport System Planning Smart Tampere, Service Network Planning
	87. The emergence of new smart and sustainable mobility and logistics services will be supported through data opening, business cooperation and the deployment of city pilot platforms and functional solutions. New solutions, such as shared leisure and commuting transport, will be piloted. Preconditions will be created for the packaging of mobility services, a compatible ticket system and various service pricing models (Mobility as a Service, MaaS).	2020–29	Smart Tampere, Business Tampere, Public Transport
	88. The growth of car-sharing services will be facilitated with parking facilities, aiming at opening the city's own rides as part of car-sharing services. In 2020, a car-sharing trial will be launched in the urban environment service area.	2020–21 2021–25	Transport System Planning Smart Tampere, Tuomi Logistiikka Oy
	89. The ports will be developed into open, accessible and attractive recreational areas where non-motorboat traffic will also be possible. To support this goal, more canoe sheds will be built and rental rowing boats will be introduced.	2020–21 2021–25	Construction and Maintenance of Urban Environment
	90. Ports will be equipped with car charging stations and preparations will be made for the electrification of waterborne traffic. The availability of biofuels for refuelling stations for boats will be improved. When tendering for refuelling stations, the criterion of obtaining biofuels and electricity charging stations in marinas is also taken into account. The operations will start in first-class ports (Mustalahti, Naistenlahti, Laukontori).	2021–25	Construction and Maintenance of Urban Environment, Real Estate and Housing
Emission reduction	●●●○○		
Cost estimate	●●●○○		
Other benefits	• Creation of new business opportunities • Smoother and faster journeys • Reduces the need to own a car • More attractive urban environment		

EXAMPLES AND IMPACT ASSESSMENTS

84.

Cost estimate: City bikes will

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 84	0	2,500	2,500
Total	**0**	**2,500**	**2,500**

Net present value of the programming period

EUR 2,200,000

Figure 37: *Operating expenses of the city bike system during the programming period. The discounted net present value of the measure for the programming period is also presented. The cost estimate includes the net costs (including ticket and advertising revenues) of the city bike system (measure 84) with the following quantities: The city centre will have 700 bicycles in 2021 and 1,000 in 2022, after which the service will be extended to regional centres and a total of 1,300 bicycles by 2030. The estimate is based on the data of the City of Tampere Transport System Planning Unit.*

Measure package 2.9.	Mobility management	Timetable in council terms	Responsibility
DESCRIPTION **Congestion problems will be resolved primarily through mobility management** **Residents will be offered trials of sustainable modes of transport** **Schoolchildren and students will be encouraged to use sustainable modes of transport** **Event admission tickets will include a public transport ticket** **Personnel public transport perks will be made more flexible**	91. A Sustainable Urban Mobility Plan (SUMP) will be prepared and the first steps launched.	2020–21	Transport System Planning
	92. An intersectoral mobility management cooperation group will be established within the city and its coordination responsibilities agreed on. An action plan for mobility management will be prepared, specifying the main target groups for mobility management, planning annual measures and responsible parties, and ensuring budgeting.	2020–21	Sustainable City, Transport System Planning
	93. Tackling congestion, primarily through mobility management rather than increasing the capacity of motoring.	2020–29	Transport System Planning
	94. Sustainable mobility and mobility services will be marketed in a customer-oriented manner, taking into account different target groups, life situations and residential areas. Providing opportunities for residents (especially current motorists) to try sustainable modes of transport.	2020–29	Transport System Planning, Public Transport, Smart Tampere
	95. Marketing sustainable modes of transport for working-age people and implementing workplace mobility management plans in cooperation with key employers.	2020–29	Public Transport, Transport System Planning Sustainable Tampere, HR
	96. Regional sustainable mobility plans will be implemented, for example with schools. Sustainable mobility of children, parents and personnel will be encouraged by means of communications. The safety of school trips will be promoted through mobility management. Information distribution on the environmental impact of drop-off traffic will be increased. Information on bus routes will be added to the websites of schools and day-care centres.	2020–21 2021–25	Education and Learning Services, Transport System Planning
	97. Students in upper secondary school and vocational education will be encouraged to cycle by offering the possibility to park bicycles safely in the school area. Bicycle-sharing bikes will be obtained for the use of students and staff. Tredu will develop sports and exercise workshops.	2021–29	General Upper Secondary Education Tampere Vocational College Tredu
	98. The use of public transport in culture and leisure services will be promoted by digitising tickets for museums, events and sports venues and including in them access to public transport free of charge or at reduced prices.	2020–21 2021–25	Cultural and Leisure Services, Public Transport, Five-star City Centre
	99. Measures will be piloted to promote the sustainable mobility of personnel and, on the basis of experience and impact gained, a more specific proposal will be made on further measures.	2020–21	Transport System Planning, HR
	100. There will be a shift to flexible public transport benefits in support of commuting, as well as the use of a common travel card, low-emission car-sharing and bicycle-sharing for work use. Examples: In Social Services and Health Care, a campaign will be organised to increase physical activity in commuting. Shared bicycles and electric bicycles will be procured for well-being centres. Shared bicycles will be procured for the use of employment services personnel, and bicycle maintenance will be offered as an incentive to use one's own bicycle. The Environmental Health Unit will map transition traffic, commuting traffic and official driving with the aim of increasing walking, cycling, car-pooling and public transport.	2020–21 2021–25	Public Transport, HR, Transport System Planning service areas
	101. Opportunities for flexible working practices, remote work and remote meetings will be improved.	2020–21 2021–25	Service areas together with the HR and ICT
Emission reduction	●●●○○		
Cost estimate	●●●○○		
Other benefits	• Positive health effects • Improvement of air quality • Reduction of noise pollution • More efficient use of urban space • Increased well-being		

EXAMPLES AND IMPACT ASSESSMENTS

91. – 96.

Cost estimate: Mobility management

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measures 91–96	0	5,300	5,300
Total	**0**	**5,300**	**5,300**

Net present value of the programming period

EUR 4,400,000

Figure 38: *Operating expenses of mobility management during the programming period. The discounted net present value of the measure for the programming period is also presented. The cost estimate is based on the expert assessment by the City of Tampere Transport System Planning Unit of the need for additional resources to achieve the goal. The assessment includes, among other things, additional human resources to enable continuous development.*

THEME 3 SUSTAINABLE CONSTRUCTION

Benefit target 2030: New construction will be at zero energy level and the carbon footprint of housing small

DESCRIPTION	The environmental burden of housing and services will be reduced by energy- and resource-efficient construction solutions and by increasing renewable energy in housing. Tampere will introduce a life-cycle assessment of construction emissions as part of planning and decision-making. The renovation of the existing building stock will play an important role in improving the energy efficiency of housing and services. Timber construction will increase carbon sequestration in buildings and reduce indirect emissions from the production of materials. CO_2 emissions from infrastructure construction will be reduced by effective soil management, such as their exploitation at source. At the same time, natural resources will be conserved and cost savings will be achieved through reduced transport. The reuse of soil generated in construction will also be increased, as landfills are slowly filling up. Efforts will be made to chain construction sites, in which case the reusable soil will go directly to the right place without intermediate storage. To enable this, information on the resulting soil will be inventoried already at the planning stage.
Target 2030	• The city's service network and service facility network plans are drawn up while minimising carbon footprint and life-cycle costs. The space efficiency of the city's service facilities will improve annually until 2030. • Carbon neutrality criteria for construction will be applied throughout the land use process (town plans, plot assignment data, building codes, infill development, incentives). • The city will improve the energy efficiency of its own building stock and curb energy consumption during use. The energy consumption of the premises will decrease in proportion to the square metres used. • City properties will be 80% carbon-neutral in terms of energy by 2025, provided that Sähkölaitos can produce an equivalent amount of carbon-neutral heat. • Share of construction of wooden blocks of flats of all new blocks of flats on plots transferred by the city (wooden frame and facade): 10% (2021), 15% (2025), 20% (2030). • Infrastructure construction will utilise all materials that can be utilised. • Transport distances will have been minimised by ensuring adequate intermediate storage and circular economy centres. • Renewable materials will be used in all suitable infrastructure construction sites. • Work machines will run on low-emission fuels. • Construction will strive to meet the emission targets by planning and using carbon footprint calculations. • Guidelines will be created for clients and operators to take climate and environmental issues into account.
Indicators	• Share of energy class A in new residential buildings (%) • Energy consumption of the residential sector (kWh per resident) • Share of timber construction of new blocks of flats on plots transferred by the city (%) • Energy consumption of city properties (total consumption and consumption per m^2) • Renewable heat and electricity as a percentage of the city's energy supply • Mass economy planning realisation of town plans (%) • Share of recovered materials in construction • Low-emission new materials (%), verification with CO_2 calculations
Starting point	• Tampere Strategy 2030 • Sustainable Tampere 2030 guidelines • Energy efficiency agreement for municipalities and the state (KETS) • Timber construction promotion programme • UUMA plan for use of recovered materials in groundworks

Situational picture: Realisation of indicators

Indicator	Unit	2015	2016	2017	2018	2019
Share of energy class A of new residential buildings	%				16	19
Energy consumption of the residential sector	kWh per resident	10,170	10,030	9,880		

EXAMPLES AND IMPACT ASSESSMENTS

Figure 39: *A growing city builds lots of housing, services and urban infrastructure. Tampere will introduce carbon neutrality criteria throughout the land use process, calculate the carbon footprint of construction and minimise it, for example, by timber construction, energy-efficient construction and utilising as much recovered materials as possible. Image source: Visit Tampere Oy/Laura Vanzo.*

Measure package 3.1.	New construction of city properties	Timetable in council terms	Responsibility
DESCRIPTION **The city will introduce assessment of carbon footprint of construction as part of planning and decision-making** **The service network's use of space will be improved and its carbon footprint reduced** **Culture and Leisure Services buildings will strive for carbon neutrality** **Demolition waste will be reused locally and recycling of building materials increased**	102. The assessment of the life-cycle carbon footprint will be included in the city's service facility network planning. Carbon footprint calculation methods will be investigated and own operations improved. The city's service facility network plans will be drawn up minimising carbon footprint and life-cycle costs and using service design methods.	2020–21 2021–25	Real Estate and Housing, Service Network Planning
	103. Information on the total space available, its number of users, capacities and utilisation rates will be maintained to serve as a basis for a comprehensive service network and service facility network plan.	2020–21 2021–25	Real Estate and Housing, Service Network Planning
	104. The use of space will be made more efficient, for example, by taking into account in the planning of the service facility network (e.g. early childhood education and basic education) that many services can be arranged outside the service facility network's service points.	2020–29	Real Estate and Housing, Service Network Planning, Education and Learning Services
	105. Wherever possible, conversion flexibility and shared use will be taken into account in the design of city premises. The temporal occupancy rate of city-managed properties will be improved by opening the premises to residents using digital solutions and by extending the opening hours of the properties' own use. Efficiency in the use of space reduces the need for new facilities. For example, the service hours of wellness centres will be gradually increased, as will the sharing of own premises in culture and leisure services. Evening use of the premises will also be increased and the premises will be opened more and more to the independent activities of city residents (wellness centres, schools, youth and leisure facilities).	2020–29	Real Estate and Housing, Service Network Planning, Tampereen Tilapalvelut Oy, service areas
	106. The carbon footprint and life-cycle costs of the city's construction projects are calculated, and different solutions are compared as part of the city's service building project planning and its justification in decision-making. The Real Estate and Housing Group will pilot the calculation method in 2020, introduce it in more project planning work in 2021 and widely adopt it in 2022.	2020–21 2021–25	Real Estate and Housing
	107. Tampereen Tilapalvelut Oy will pilot the Ministry of the Environment's carbon footprint calculation tool in 2020 during a construction project's implementation planning phase and, from 2021, incorporate life-cycle carbon footprint calculation and life-cycle cost calculation extensively into construction project implementation planning, and prepare for the standard carbon footprint guidance that will enter into force in 2024.	2020–21 2021–25	Tampereen Tilapalvelut Oy
	108. Culture and Leisure Services' property projects will aim to achieve low carbon/carbon neutrality and ensure conditions for sustainable activities (e.g. Sara Hildén Art Museum, Tampere Art Museum, Nekala container library, outdoor sports facilities, Hiedanranta).	2020–29	Culture and Leisure Services, Real Estate and Housing
	109. City Group rental housing communities will contribute to the city's carbon-neutrality goal by preparing their own roadmaps to achieve the target.	2020–21	City Group housing communities
	110. Construction and planning processes will be designed to ensure that demolition waste from the city's buildings will be used more locally in construction, and the amount of waste and its utilisation will be monitored. If the city's any new building is located on a property where an unusable building is first demolished, the possibilities of utilising the demolished material in the new construction will always be considered.	2021–25	Real Estate and Housing, Construction and Maintenance of Urban Environment, Tampereen Tilapalvelut Oy, Tampereen Infra Oy
	111. The city's construction projects will increase the recycling and processing of building materials and the choice of low-carbon materials. The city will revamp the procurement criteria for demolition works in accordance with the Ministry of the Environment's procurement guide on circular economy in public demolition projects. A process description for ordering demolitions will be prepared.	2020–21 2021–25	Real Estate and Housing, Tampereen Tilapalvelut Oy
Emission reduction	●●●○○		
Cost estimate	●●●○○		
Other benefits	• More efficient use of resources and space • Life-cycle savings		

EXAMPLES AND IMPACT ASSESSMENTS

102. - 103., 105. - 107., 110. - 111.

Cost estimate: Calculation of carbon footprint and development of the utilisation of demolition waste

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measures 102–103, 105–107, 110–111.	0	510	510
Total	**0**	**510**	**510**

Net present value of the programming period

EUR 450,000

Figure 40: *Operating expenses for the construction of new city properties during the programming period. The discounted net present value of the measure for the programming period is also presented. The cost estimate is based on the estimates of Tampereen Tilapalvelut Oy and the City of Tampere's Real Estate and Housing service group.*

Measure package 3.2.	Guidance of private new construction	Timetable in council terms	Responsibility
DESCRIPTION **Plot assignment will introduce carbon footprint assessment** **Land policy incentives will be developed to promote low-carbon construction** **Net zero energy and plus energy construction will be promoted** **Sustainable and smart construction themes will be linked to plot application annually**	112. Carbon footprint assessment (testing, piloting, competitions, commissioning) will be integrated into the current plot assignment process. This will start with residential construction plots and will also be adopted for the most significant commercial plots.	2021–25	Real Estate and Housing, Sustainable City, Building Control Department
	113. The effectiveness of the infill development incentives mentioned in the land policy guidelines will be assessed in 2021 in connection with the updating of the housing and land policy guidelines for the next council term. On the basis of the assessment, housing and land policy guidelines will be updated with the aim of providing more effective incentives to promote low-carbon construction.	2021–25	Real Estate and Housing, Sustainable City
	114. The impact of the energy efficiency incentive for homebuilders will be assessed in connection with the updating of the housing and land policy guidelines for the next council term, and the incentives will be updated to the guidelines.	2021–25	Real Estate and Housing, Sustainable City
	115. Direct construction towards net zero energy construction and, in the long term, towards plus energy construction. Nearly-zero energy construction regulations will enter into force in all construction on 31 December 2020. How the city can steer construction to better than the required level (class A or B) will be investigated.	2020–21 2021–25	Real Estate and Housing, Sustainable City, Tampereen Tilapalvelut Oy
	116. A communications campaign for housing companies will be organised to encourage infill development. The campaign will promote urban land policy incentives for infill development and introduce good practices for combining refurbishment, energy refurbishment and infill development.	2020–21	Sustainable City, Five-star City Centre Development Programme, Comprehensive Planning, Detailed Planning, Real Estate and Housing, Ekokumppanit Oy
	117. Plot search programming will present the themes and plots of sustainable and smart construction each year.	2020–21 2021–25	Real Estate and Housing, Sustainable City
Emission reduction	●●●○○		
Cost estimate	●●○○○		
Other benefits	• More efficient use of resources • Life-cycle economic impacts • Development of sustainable construction know-how and business		

EXAMPLES AND IMPACT ASSESSMENTS

117.

Themes of sustainable and smart construction in the plot application programme 2020:

- Year 2020: timber construction (on the basis of the successful work in the housing reform competition, the plot assignment competition), sharing facilities and services.
- Year 2021: timber construction, 'urban green' house, carbon-neutral residential block.
- Year 2022: smart energy building, circular-economy house.
- Years 2023–24: timber construction, energy positivity.
- Year 2025: renewable energy solutions are required on plots outside the district heating network, energy-positive buildings.

Figure 41: *In 2019, the Vuores zero energy block plot assignment competition, organised by the City of Tampere and the Energy Wise Cities project, was won by this block of wooden buildings prepared by the construction Rakennusyhtiö Lehto Asunnot Oy, LUO Arkkitehdit Oy, Insinööritoimisto Vesitaitoimisto Oy and Frei Zimmer. Image source: LUO Arkkitehdit.*

Measure package 3.3.	Repair construction of city properties	Timetable in council terms	Responsibility
DESCRIPTION **City properties will be supplied with electricity and heat from renewable energy sources** **A plan will be drawn up for the energy renovation of service buildings** **Service buildings will be developed into virtual power plants** **Tredu will develop green campuses**	118. The Sustainable Development Unit will calculate the amount of carbon dioxide emissions from the city's building stock and monitor and report on developments.	2020–21	Sustainable City, Real Estate and Housing
	119. The city will obtain electricity and heat from renewable energy sources.	2020–29	Tampereen Tilapalvelut Oy
	120. A plan will be prepared for energy renovation of the city's service buildings. In connection with renovation of service buildings, the feasibility of energy renovation will always be investigated. Applying for energy subsidies (e.g. Climate Invest funding) will be integrated into the planning process. Project cards will be created of good technologies, which will be introduced into project planning. The Tapre guidelines will be updated.	2020–21	Tampereen Tilapalvelut Oy, Real Estate and Housing
	121. During 2017–2025, an energy saving project will be carried out in ten school buildings using the so-called ESCO (Energy Service Company) concept. On the basis of experience, the next ESCO project will be prepared and the operating model will be further developed.	2020–21 2021–25	Real Estate and Housing, Tampereen Tilapalvelut Oy, Sustainable City
	122. Service buildings and the city's land assets will be developed into virtual power plants for the district heating network and the electricity network. Smart district heating will be introduced in city properties. This will promote the management of district heating consumption peaks and smarter control of building technology.	2020–21 2021–25	Tampereen Tilapalvelut Oy, Sustainable City
	123. A space efficiency and cost level target, as well as energy and environmental targets, will be defined for properties managed by the city, sorted by purpose, by 2021. An up-to-date database will be developed for information. The information and service design are used to outline changes in the service network.	2020–21 2021–25	Real Estate and Housing, Tampereen Tilapalvelut Oy, Service Network Planning
	124. Property management reporting will be developed to be site specific and digital by the end of 2020. The site-specific report includes the monthly costs of maintenance, care of outdoor areas, security, waste management, electricity, heat and water, as well as the monthly consumption of electricity, heat and water. Information about faults is automatically sent to service.	2020–21	Real Estate and Housing, Tampereen Tilapalvelut Oy
	125. Tampere Vocational College will apply for Green Campus certification in three locations (Metsätie, Ajokinkuja and Santalahti) by 2025. The aim is to certify as many properties as possible by 2030.	2021–25 2025–29	Tampere Vocational College Tredu
Emission reduction	●●●○○		
Cost estimate	●●●○○		
Other benefits	• Savings in property maintenance costs • Economic impacts over the life-cycle of buildings • Improved well-being • Reduction of indoor air problems		

EXAMPLES AND IMPACT ASSESSMENTS

121. - 124.

Cost estimate: Energy renovations

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 121	0	50	50
Measure 122	420	0	420
Measure 123	0	50	0
Measure 124	0	250	250
Total	**420**	**350**	**770**

Net present value of the programming period

EUR 400,000

Figure 42: *Investment and operating expenses for repair construction of city properties during the programming period. In addition, the discounted net present value of the measures for the programming period is presented. The cost estimate indicates the need for an additional resource to the current allocation of EUR 1 million for small energy renovations. The cost estimate is based on the estimates of Tampereen Tilapalvelut Oy and the City of Tampere's Real Estate and Housing service group.*

Measure package 3.4.	Repair construction of private properties	Timetable in council terms	Responsibility
DESCRIPTION **Energy-efficient repair construction will be promoted in cooperation with the city, companies and housing companies**	126. Energy counselling for housing companies and residents will be developed. There will be cooperation with housing companies and property managers on energy-efficiency issues. The implementation of demand response services for blocks of flats will be enhanced.	2020–21	Sustainable City, Ekokumppanit Oy
	127. The use of open building databases and building data will be increased in the development and marketing of local energy-efficiency companies' services.	2020–21 2021–25	Sustainable City, Ekokumppanit Oy, Building Control Department
Emission reduction	●●●●○		
Cost estimate	●●●○○		
Other benefits	• Savings in property maintenance costs • Protecting the value of buildings • Improved comfort of living • Development of sustainable construction know-how and business		

EXAMPLES AND IMPACT ASSESSMENTS

126.

Estimated emissions and costs: Energy counselling

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	Energy renovation and counselling will remain at the current level (counselling EUR 30,000 per year).
KT2030 scenario	The amount of energy counselling will be multiplied tenfold in order to achieve all cost-effective energy efficiency measures and the increase of renewable energy.

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	The additional cost of increasing energy counselling for the programming period is EUR 2.7 million. The discounted net present value of the measure for the programming period is EUR 2.3 million.
Emissions reduction in 2030	27,800 tCO_2e
Cost of emission reduction	EUR 10 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 126	0	2,700	2,700
Total	**0**	**2,700**	**2,700**

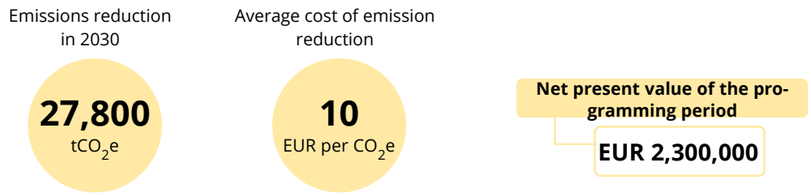


Figure 43: *Operating expenses of the tenfold multiplication of energy counselling during the programming period, emission reductions in 2030 (tCO_2e) and the average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented. The assessment is based on the calculations of Ekokumppanit Oy and the Sustainable Development Unit.*

Figure 44: *In order for the carbon-neutrality goal to succeed, it is important to promote the energy renovation of buildings and the transition to renewable energy. Energy counselling is also a very cost-effective way of reducing emissions.*
Image source: Visit Tampere Oy/Laura Vanzo.

Measure package 3.5.	Timber construction	Timetable in council terms	Responsibility
DESCRIPTION **Suitable sites for timber construction will be zoned** **Plots will be granted for timber construction all over the city** **Daycare, school and other service buildings will be constructed of wood**	128. The town plan programme will define planning sites that promote timber construction opportunities. In accordance with the zoning programme 2020–2024, timber construction will be investigated, for example in Hiedanranta, the area west of Lake Alasjärvi, Amuri, Onkiniemi, the northern shore of Lake Kaukajärvi and Viinikanlahti.	2020–21 2021–25	Detailed Planning, Sustainable City
	129. Guidelines will be prepared to promote timber construction in Detailed Planning.	2020–21	Detailed Planning, Sustainable City, Building Control
	130. Timber construction will be promoted by implementing the largest timber construction area in Finland, which is also an eco-efficient and energy-efficient residential area, in Isokuusi, Vuores. Plots will be granted for timber construction all over the city. Each year, plot assignment programming based on the town plan programme will decide on the plots to be assigned for timber construction. The programme for the promotion of timber construction in the city will also be taken into account in plot application programming.	2020–29	Real Estate and Housing, Detailed Planning Sustainable City
	131 Timber construction will be promoted by constructing day-care centres, school and other service buildings out of wood. The first projects are the Hippos day-care centre in 2019 and the Isokuusi unit for young children in 2020. Options for materials will always be investigated in the material requirements planning phase.	2020–21 2021–25	Real Estate and Housing, Tampereen Tilapalvelut Oy
	132. In the annual investment plan, timber construction projects in infrastructure construction, also in planning areas, will be decided. (Bridges, park structures, streetlight poles, park construction competitions).	2020–21	Construction and Maintenance of Urban Environment, Sustainable City
	133. In addition, the aim is to encourage the building of additional floors in infill development with high quality using wood.	2020–29	Detailed Planning, Building Control Department Sustainable City
Emission reduction	●●●○○		
Cost estimate	●●●○○		
Other benefits	• Promoting diverse urban development • Promoting expertise and business in timber construction • Promoting competition in building materials		

EXAMPLES AND IMPACT ASSESSMENTS

131.

Estimated emissions and costs: Timber construction

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	The share of wooden buildings in city properties will remain unchanged.
KT2030 scenario	Timber construction will increase in city properties, amounting to 2,200brm ^{2} of timber construction per year in 2021–2023, 3,300brm^2 per year in 2024–2027 and 4,400brm^2 per year in 2028–2030.

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	The additional costs of increasing timber construction over the programming period are EUR 5.3 million. Taking into account the life-cycle of the measure and evaluating the investments for the programming period, the discounted net present value of the measure is EUR 1.1 million.

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 131	5,300	0	5,300
Total	**5,300**	**0**	**5,300**

Net present value of the programming period

EUR 1,100,000

Figure 45: *Timber construction investments during the programming period. In addition, the discounted net present value of the measures for the programming period is presented. The cost estimate is based on the calculation of the City of Tampere Sustainable Development Unit. The starting values of the calculation have been checked from the City of Tampere Real Estate and Housing service group.*

Measure package 3.6.	Infrastructure construction	Timetable in council terms	Responsibility
DESCRIPTION **An infrastructure construction carbon footprint calculation tool will be adopted** **Emissions reduction requirements will be set for materials, equipment and logistics** **Land masses use and recycling will be improved**	134. Existing tools for the life-cycle assessment and carbon footprint calculation of infrastructure construction will be investigated and a suitable tool introduced. The aim is to have a common tool for large cities. It will be determined in which works life-cycle assessments and greenhouse gas emission calculations are to be carried out. Project planning will also review the prefabrication procedures from the point of view of the carbon footprint. The use of eco-compensation will be piloted, for example, in large infrastructure projects.	2020–21 2021–25	Construction and Maintenance of Urban Environment
	135. Emission reduction requirements will be set for materials in site design for all major projects. Emission reduction requirements will be set for appropriate items (equipment, logistics) in tendering procedures for major regional construction projects.	2020–21	Construction and Maintenance of Urban Environment
	136. Greenhouse gas emissions and costs of different types of bridge solutions will be calculated. Theses will be made use of.	2020–21	Construction and Maintenance of Urban Environment
	137 The efficiency of the use of land masses for infrastructure construction will be increased and its transport reduced by introducing land mass balance policies to increase the recycling of land masses (land mass bank, land mass coordinator and land mass analysis of town plans). The land mass coordinator will start working and regional cooperation will be resolved in 2020.	2020–21 2021–25	Construction and Maintenance of Urban Environment, Detailed Planning, Comprehensive Planning, Sustainable City
	138. The participation of the city's infrastructure industry in an open and mobile soil information platform (soil exchange or similar) will be promoted. This will be taken into account when purchasing an ERP system.	2020–21 2021–25	Construction and Maintenance of Urban Environment
	139. The need for and impact of intermediate storage areas for soil will be investigated together with planning and the Real Estate and Housing group. An impact assessment of the Kolmenkulma interim storage area will be launched in 2020. Snow transport distances will be minimised by reserving places for them. The network will be updated annually.	2020–29	Construction and Maintenance of Urban Environment, Real Estate and Housing, Comprehensive Planning, Detailed Planning
	140. The city's own construction and planning sites will utilise natural landscapes and local structures.	2020–29	Construction and Maintenance of Urban Environment, Detailed Planning
	141. The need for road maintenance will be optimised by developing real-time data collection on road condition. The CityIoT project will test data collected automatically by utility traffic that reduces the need for special measurements and unnecessary anti-slip measures taken "for safety's sake".	2020–21	Construction and Maintenance of Urban Environment, Smart Tampere
Emission reduction	●●●○○		
Cost estimate	●○○○○		
Other benefits	• Improved resource efficiency • Life-cycle cost savings		

EXAMPLES AND IMPACT ASSESSMENTS

137.

Cost estimate: Utilisation of land masses

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 137	0	-6,200	-6,200
Total	**0**	**-6,200**	**-6,200**

Net present value of the programming period

EUR -5,200,000

Figure 46: *The operational economic impact of the reduction of land masses transport over the programming period. The discounted net present value of the measure for the programming period is also presented. The measure will lead to cost savings. The estimate is based on the calculation of the City of Tampere Infrastructure Management Unit and the Sustainable Development Unit.*

Measure package 3.7.	Use of recycled materials	Timetable in council terms	Responsibility
DESCRIPTION **Recycled material will be primarily used in street construction** **Demolition sites improve recycling of concrete**	142 The possibility of using recovered materials will always be assessed in the project and building design of public streets and park areas. The use of recovered materials will be assessed both in terms of emission reductions and costs. In street plans, there will be a move to a model of two alternative solutions, where the structural layers will use primarily recycled material, if available, and secondarily rock crush. Construction sites using recovered materials (including recycled concrete, ash) will be mapped and listed annually. The use of recovered materials will be piloted, for example in Hiedanranta. It will be determined whether recovered materials can be used in the extension part of Sammon valtatie cycling route.	2020–29	Construction and Maintenance of Urban Environment, Sustainable City, Hiedanranta Development Programme, Hiedanrannan Kehitys Oy
	143. An up-to-date database of recycled materials will be established and maintained.	2020–21	Construction and Maintenance of Urban Environment
	144. An operating model will be developed to enhance recycling of concrete at the city's demolition sites. The experiences of the Kalevankulma site will be utilised in this.	2020–21	Construction and Maintenance of Urban Environment, Real Estate and Housing, Tampereen Tilapalvelut Oy
	145. A study will be carried out on the utilisation of the side aggregate produced in Teisko.	2020–21	Construction and Maintenance of Urban Environment
	146. In the case of asphalt procurement, the technical and economic conditions and effects of the transition to lower emission production methods (including green asphalt) will be investigated.	2020–21	Construction and Maintenance of Urban Environment
	147. The use of recycled material (crushed concrete) as a substitute for rock crushing will be facilitated in private construction on city rental plots.	2020–21	Real Estate and Housing
Emission reduction	●●○○○		
Cost estimate	●○○○○		
Other benefits	• Improved resource efficiency • Life-cycle cost savings		

EXAMPLES AND IMPACT ASSESSMENTS

142.

Cost estimate: Utilising recyclable materials

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 142	0	-630	-630
Total	**0**	**-630**	**-630**

Net present value of the programming period

EUR -530,000

Figure 47: *Operational economic impact of the use of recycled materials during the programming period. The discounted net present value of the measure for the programming period is also presented. The measure will lead to cost benefits. The estimate is based on the calculation of the City of Tampere Infrastructure Management Unit and the Sustainable Development Unit.*

Figure 48: *Tampere will increase the use of recycled materials in street and park construction, thus promoting the saving of natural resources and the circular economy. Image source: Business Tampere Oy/Mirella Mellonmaa.*

THEME 4 SUSTAINABLE ENERGY

Benefit target 2030: Renewable energy to account for 80%

DESCRIPTION	Emissions from the production of electricity and district heat in Tampere will be significantly reduced by switching energy sources to renewable energy. The main objectives of the energy transition carried out by Tampereen Sähkölaitos power utility are increasing the use of domestic renewable energy, reducing greenhouse gas emissions and increasing the number of jobs in the timber supply chain in the Tampere region. Smart energy technologies can optimise energy consumption, save energy and keep costs under control. Tampere will move to smart outdoor lighting by 2025. Increasing decentralised renewable energy production, such as solar energy and heat pumps, will reduce emissions if it replaces fossil energy. Energy efficiency will improve and emissions decrease, as energy production avoids energy transfer losses. In addition, decentralised solutions will enable the introduction of new technologies. Replacing oil heating with a sustainable heat source, such as a heat pump, district heating or a biomass boiler, significantly reduces climate emissions.
Target 2030	• Share of renewable energy of the energy production of Tampereen Sähkölaitos power utility: 49% (2021), 80% (2025), 90% (2030) • Reduction of greenhouse gas emissions in the production of Tampereen Sähkölaitos from 2010: 47% (2021), 80% (2025), 95% (2030) • The city will give up oil heating in its own properties by 2025 • The production of grid-connected solar energy will increase throughout the city to 20MW (around 0.2MW in 2020) • The use of fossil oil in the individual heating of buildings has stopped
Indicators	• Share of renewable energy in the production of Tampereen Sähkölaitos power utility(%) • Emissions from centralised energy production (t CO_2e) • Distribution of heating methods of buildings (%) • Emissions from oil heating (t CO_2e) • Solar panel systems (pcs) in the grid in the Tampere region and their combined power (MW)
Starting point	• Tampere Strategy 2030 • Sustainable Tampere 2030 guidelines • Tampereen Sähkölaitos Group's strategy, Energy transition to the future

Situational picture: Realisation of indicators

Indicator	Unit	2014	2015	2016	2017	2018	2019
Share of renewable energy in the production of Tampereen Sähkölaitos	%	27.3	31.3	38.7	47	43.5	45.1
Emissions from centralised energy production	kt CO_2	624	562	521	493	527	503
Grid-connected solar panel systems in Tampere	pcs	27	44	70	132	214	380

EXAMPLES AND IMPACT ASSESSMENTS

Between 2010 and 2030, carbon dioxide emissions from the production of Tampereen Sähkölaitos will decrease by 95%.

2010	2015	2020	2025	2030
983 kt CO_2	562 kt CO_2	468 kt CO_2	191 kt CO_2	53 kt CO_2
Rehabilitation of hydroelectric power plants	Tammervoima Waste-to-Energy Plant	Kaupinoja District Cooling Plant	**New technologies New products and energy savings**	**Emission compensation**
Sarankulma Pellet Heating Plant	Hervanta Woodchip Heating Plant	**Naistenlahti 3**	**New biowaste treatment plant**	**Geothermal plant**
	Flue gas scrubbers	**District heat battery**	**Virtual battery**	**Shutdown of the Lielahti Gas Power Plant**

The share of renewable energy in the production of Tampereen Sähkölaitos will increase to 90% by 2030.

2010	2015	2020	2025	2030
10%	35%	49%	80%	90%

Energy procurement and CO_2 emissions of Tampereen Sähkölaitos

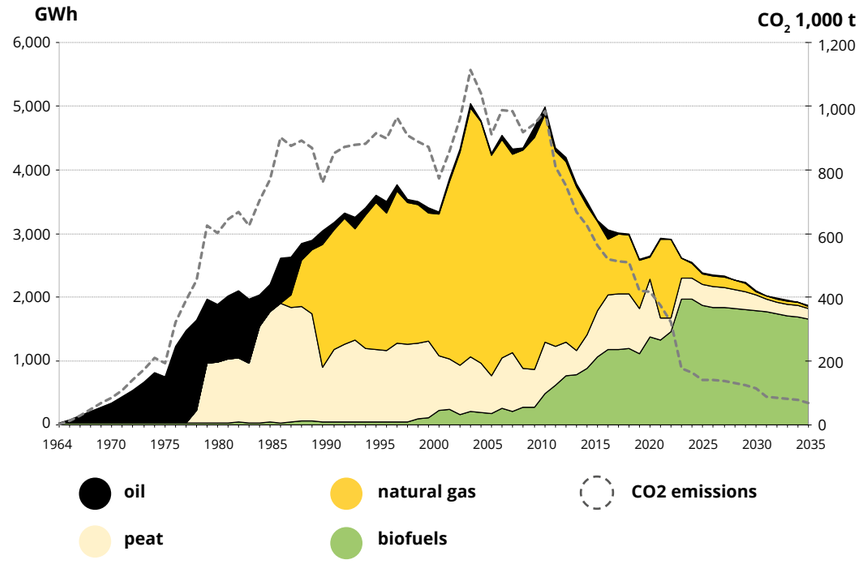


Figure 49: *Tampereen Sähkölaitos Oy's energy strategy 2010–2030.*

Measure package 4.1.	Centralised renewable energy	Timetable in council terms	Responsibility
DESCRIPTION **Naistenlahti Power Plant will be converted to using biofuels** **Adoption of geothermal heat will be prepared for** **Lielahti Natural Gas Power Plant will be decommissioned**	148. The Naistenlahti 2 power plant unit will be converted (2020–22), allowing 100% renewable biofuels to be used in the new Naistenlahti 3 Power Plant in future.	2020–21 2021–25	Tampereen Sähkölaitos Oy
	149. Investment in a new biomass heating plant, if the project is found to be viable.	2021–25	Tampereen Sähkölaitos Oy
	150. The technology of geothermal installations will be developed in cooperation with other actors.	2020–29	Tampereen Sähkölaitos Oy
	151. The energy efficiency of the Tammervoima Waste-to-Energy Plant will be enhanced by improving the quality of the waste to be incinerated by improving the sorting of glass, metal and organic waste as well as the operation of the waste pre-treatment plant.	2021–25	Pirkanmaan Jätehuolto Oy, Tammervoima Oy
	152. The Lielahti Natural Gas Power Plant will be shut down.	2025–29	Tampereen Sähkölaitos Oy
	153. City properties will be connected to the district cooling network according to need when the network is expanded.	2020–29	Real Estate and Housing, Tampereen Tilapalvelut Oy
Emission reduction	●●●●●		
Cost estimate	●●●●●		
Other benefits	• Modernisation and extension of the lifespan of Naistenlahti Power Plant • Versatile and economical range of fuels • Utilisation of local renewable energy		

EXAMPLES AND IMPACT ASSESSMENTS

148.

Estimated emissions and costs: Conversion of Naistenlahti Power Plant

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 148	130,000	0	130,000
Total	**130,000**	**0**	**130,000**

Emissions reduction in 2030: **82,000** tCO_2e

Average cost of emission reduction: **40** EUR per CO_2e

Net present value of the programming period: **EUR 30,000,000**

Figure 50: *Investments in conversion of Naistenlahti Power Plant during the programming period, emission reductions in 2030 (tCO_2e) and average cost of emission reductions (EUR per tCO_2e). The measure is already being implemented, and the plant will be completed in 2022. The discounted net present value of the measure for the programming period is also presented. Estimates of costs and emission reductions are based on data from Tampereen Sähkölaitos.*

153.

Cost estimate: City properties will be connected to the district cooling network.

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 153	1,100	0	1,100
Total	**1,100**	**0**	**1,100**

Net present value of the programming period: **EUR 150,000**

Figure 51: *Investments in connecting city properties to the district cooling network during the programming period. The discounted net present value of the measure for the programming period is also presented. The cost estimate is based on data from Tampereen Tilapalvelut Oy and the Real Estate and Housing service group of the City of Tampere.*

Measure package 4.2.	Smart energy networks and services	Timetable in council terms	Responsibility
DESCRIPTION **New, smart energy technologies will be developed** **Street lighting will be upgraded to smart LED technology**	154. Tampereen Sähkölaitos's demand side management and energy saving services will be further developed and marketed to customers.	2020–21	Tampereen Sähkölaitos Oy
	155. District heating battery technology will be developed and piloted.	2020–21	Tampereen Sähkölaitos Oy
	156. Technologies for a smart grid and virtual power plants will be developed and piloted.	2021–25	Tampereen Sähkölaitos Oy
	157. The city's street lighting will be converted into LEDs and smart light control will be implemented by 2025.	2020–21 2021–25	Construction and Maintenance of Urban Environment
Emission reduction	●●●○○		
Cost estimate	●●○○○		
Other benefits	• Developing new skills and business • Reduced life-cycle costs in street lighting • Diversification of the energy system		

EXAMPLES AND IMPACT ASSESSMENTS

155.

Cost estimate: Development of the district heating battery

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 155	6,000	0	6,000
Total	**6,000**	**0**	**6,000**

Net present value of the programming period

EUR 1,700,000

Figure 52: *Investments in the district heating battery during the programming period. The discounted net present value of the measure for the programming period is also presented. The cost estimate is based on Tampereen Sähkölaitos's own estimate.*

157.

Estimated emissions and costs: Replacement of outdoor lights with smart LED lights

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	The city will replace the current outdoor lights with smart LED lights, 1,000 units per year. In the current state, about 29,000 units use old technology and about 14,000 units use LED lights. In addition, there will be 400 new units per year due to the city's growth, and they will always be implemented with LED lights.
KT2030 scenario	95% of the city's outdoor lighting will be replaced with smart control LED lights by 2025.

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	The cost savings of switching to LED lights during the programming period are EUR 1.7 million. Taking into account the life cycle of the investments, and when they are only partially evaluated for the programming period, the net present value of the measure is EUR -4.4 million. The measure is therefore financially viable.
Emissions reduction in 2030	120 tCO_2e
Cost of emission reduction	EUR -2,400 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 157	6,100	-7,800	-1,700
Total	**6,100**	**-7,800**	**-1,700**

Emissions reduction in 2030

120
tCO_2e

Average cost of emission reduction

-2400
EUR per CO_2e

Net present value of the programming period

EUR -4,400,000

Figure 53: *Investments and operating expenses of the change of LED lights in outdoor lighting under KT2030 scenario during the programming period, emission reductions in 2030 (tCO_2e) and the average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented. The cost estimate is based on the calculation prepared by the City of Tampere Sustainable Development Unit, for which preliminary data have been obtained from the Service Group for Construction and Maintenance of Urban Environment.*

Measure package 4.3.	Decentralised renewable energy	Timetable in council terms	Responsibility
DESCRIPTION **New energy systems will be promoted by means of plot assignment** **Installation of solar panels will always be investigated in repair construction** **Tampereen Sähkölaitos will expand the solar power plant**	158. The piloting of new decentralised energy systems will be promoted in plot assignment terms and conditions and competitions in accordance with the guidelines and initiatives of the Sustainable Development Unit. The results of the pilots will be monitored and the activities expanded as experience is gained.	2020–21 2021–25	Sustainable City, Real Estate and Energy Policy
	159. The primary energy needs of city properties will be reduced in connection with new construction and repair construction. The usability of solar panels and air to water heat pumps will be investigated at all construction sites and the implementation decided on a case-by-case basis. The installation possibilities of solar panels will be investigated in connection with general renovations and energy renovations, for example in primary schools, upper secondary schools and Tampere Vocational College Tredu properties, as well as culture and leisure facilities. In school buildings, data from solar panels and energy saving will also be used in education.	2020–29	Real Estate and Energy Policy, Education and Learning Services, upper secondary school services, Tampere Vocational College Tredu, Culture and Leisure Services, Tampereen Tilapalvelut Oy
	160. Tampereen Sähkölaitos promotes the expansion of solar energy, e.g. by expanding the Tarastenjärvi Solar Power Plant and selling solar energy installation packages and by participating in remote solar energy production systems, such as Ilokkaanpuisto.	2020–29	Tampereen Sähkölaitos Oy
Emission reduction	●●○○○		
Cost estimate	●●○○○		
Other benefits	• Development of new services and business • Decreased life-cycle costs • Diversification of the energy system • Image benefits		

EXAMPLES AND IMPACT ASSESSMENTS

159.

Estimated emissions and costs: Increasing solar energy in city properties

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	The annual solar panel capacity of city properties is 63kWp and the peak operating time is 900h. Thus, in the current situation scenario, annual output is assumed to be 56.7MWh and to remain at this level until 2030.
KT2030 scenario	The amount of solar energy produced in city properties is expected to increase tenfold linearly by 2030, meaning that in the target year of 2030, the annual capacity is expected to be 630kWp and annual production 567MWh.

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result
Cost impact in the programming period	The additional cost of adding solar panels to city properties during the programming period is EUR 250,000. Taking into account the life cycle of the investments, and when they are only partially evaluated for the programming period, the net present value of the measure is EUR -140,000. The measure is therefore financially viable.
Emissions reduction in 2030	20 tCO_2e
Cost of emission reduction	EUR -1100 per tCO_2e

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 159	510	-260	250
Total	**510**	**-260**	**250**

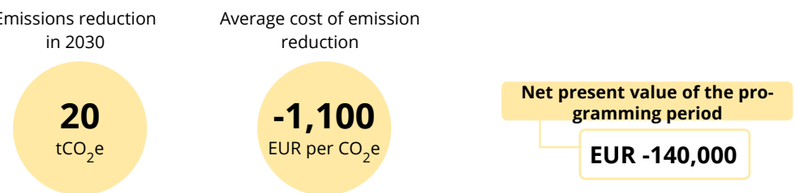


Figure 54: *Investments and operating expenses of increasing the number of solar panels under KT2030 scenario during the programming period, emission reductions in 2030 (tCO_2e) and the average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented. Measure 159 of the roadmap concerns only the exploration of the potential for increasing the number of solar panels, but the potential for cost-effectiveness and emission reduction to increase the amount of solar energy in city properties tenfold by 2030 are given as examples. The calculation has been made by the City of Tampere's Sustainable Development Unit.*

Measure package 4.4.	Giving up oil heating	Timetable in council terms	Responsibility
DESCRIPTION **The city will give up oil heating and encourage oil heaters to switch to renewable energy**	161. Oil heating hubs in housing will be identified in order to encourage and guide the change in heating methods more effectively. An operating model will be established to support the change of heating system in detached homes using oil heating. Efforts will be made to make use of government subsidies.	2020–21 2021–25	Sustainable City, Ekokumppanit Oy, Building Control Department
	162. Oil heating will be given up in the city's own buildings by 2025. Efforts will be made to make use of government subsidies.	2020–21 2021–25	Real Estate and Energy Policy, Tampereen Tilapalvelut Oy
Emission reduction	●●●●○		
Cost estimate	●●○○○		
Other benefits	• Increased energy self-sufficiency • New services and business models • Decreased local emissions		

EXAMPLES AND IMPACT ASSESSMENTS

162.

Estimated emissions and costs: Abandoning oil heating in city properties

DEVELOPMENT TRAJECTORIES TO BE REVIEWED:

Scenario	Definition
Business as usual	In city properties, oil heating will be replaced by water to air heat pumps, 5% per year.
KT2030 scenario	City properties will replace oil heating with water to air heat pump systems by 2025.

RESULTS OF THE REVIEW OF KT2030 SCENARIO COMPARED TO CURRENT DEVELOPMENT:

KT2030 scenario	Result		
Cost impact in the programming period	The cost savings for the programming period for abandoning oil heating in city properties are EUR 100,000. Taking into account the life cycle of the investments, and when they are only partially evaluated for the programming period, the net present value of the measure is EUR -900,000. The measure is therefore financially viable.		
Emissions reduction in 2030	620 tCO_2e		
Cost of emission reduction	EUR -170 per tCO_2e		
	Investments (EUR 1,000)	**Operating expenses (EUR 1,000)**	**Total (EUR 1,000)**
Measure 162	1,500	-1,600	-100
Total	**1,500**	**-1,600**	**-100**

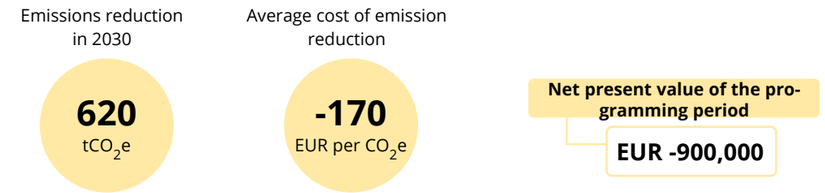


Figure 55: *Investments and operating expenses of abandoning oil heating under KT2030 scenario during the programming period, emission reductions in 2030 (tCO_2e) and the average cost of emission reductions (EUR per tCO_2e) compared to current development. The discounted net present value of the measure for the programming period is also presented. The calculation was made in the City of Tampere's Sustainable Development Unit, and initial values for the calculation were received from Tampereen Tilapalvelut Oy.*

THEME 5 SUSTAINABLE CONSUMPTION

Benefit target 2030: Consumption is sustainable and the circular economy functional

DESCRIPTION

Material recycling and utilisation contribute to the circular economy, which aims to create economic value from fewer materials and to preserve the materials and the value attached to them in the economy for as long as possible. In practice, this means improving material efficiency, increasing product life cycle and also reducing climate emissions as consumption of natural resources decreases. Effective recycling of materials is a prerequisite for a circular economy. The EU Waste Directive aims to increase the recycling rate of municipal waste to 60% by 2030.

Greenhouse gas emissions from consumption are significant, which is why it is important for the city to lead by example in reducing consumption and to encourage sustainable and emission-reducing consumption patterns among residents and businesses.

Food production accounts for a large proportion of emissions from consumption. A vegetarian diet is not only healthy, but also climate-friendly. The city promotes it in workplace lunches and school meals.

Material efficiency and eco-efficiency are a key criterion in the city's investments, projects and procurement. Promoting sustainable procurement can achieve both cost savings and reductions in greenhouse gas emissions.

The procurement of the city's services and materials takes into account the climate impact and other environmental impacts during their life cycle. The city sets requirements for the carbon dioxide emissions, energy efficiency, renewable energy, material efficiency, recyclability, harmful substances and other aspects of sustainable development in its procurement.

In Tampere, increasing digital services is a cross-cutting goal that can also reduce the consumption of materials and the need for transport. Other forms of sustainable consumption include equipment sharing and different types of reuse.

Sustainable consumption is only possible if there are sustainable products and services on the market. The city's industrial policy promotes new businesses and sustainable events based on carbon neutrality, ecological investment, cleantech and the circular economy through a platform-based and ecosystemic approach.

Target 2030

- Municipal waste recycling rate: 50% (2021), 55% (2025), 60% (2030).
- The circular economy business has expanded and the re-use of raw materials has increased.
- Biomass processing and nutrient recycling and the development of new high-level products from biomass have become more efficient.
- Environmental criteria and life-cycle impacts are taken into account, where applicable, in the most climate-relevant city procurements.
- Share of Voimia units offering vegetarian options: 50% (2023), 70% (2030).
- The amount of food waste in Voimia kitchens has decreased.

Indicators

- Recovery rate of organic and recyclable waste (%)
- Mixed waste composition
- Share of city procurement with environmental criteria (%)
- Amount of food waste in Voimia kitchens (%)
- Share (%) of Voimia units offering vegetarian options

Starting point

- EU and Finnish regulations on waste recycling
- Tampere Strategy 2030
- Sustainable Tampere 2030 guidelines

Situational picture: Realisation of indicators

Indicator	Unit	2014	2015	2016	2017	2018	2019
Share of city procurement with environmental criteria	%				25	33	39
Amount of mixed household waste	kg per resident	180	182	178	173	168	165

EXAMPLES AND IMPACT ASSESSMENTS

Figure 56: *In order to promote sustainable consumption, the City of Tampere organises, for example, The Green Week event, which has become a very popular market for goods. The development of services of the sharing economy and green procurement are an important part of sustainable consumption. Image source: Ekokumppanit Oy.*

Measure package 5.1.	Waste management	Timetable in council terms	Responsibility
DESCRIPTION	163. The waste management regulations will be updated by 2022 so that separate collection of organic waste, plastic, metal, glass and cardboard is mandatory for every building with more than five housing units in population centres with more than 200 inhabitants.	2021–25	Waste Management Authority
Waste sorting obligation will be strengthened	164. The waste management regulations will be updated by 2024 so that separate collection of organic waste is mandatory for every building in population centres with more than 10,000 inhabitants.	2021–25	Waste Management Authority
The incentive effect of waste fees will be strengthened to improve sorting	165. The incentive effect of waste fees will be strengthened to improve the sorting of organic and recyclable waste.	2020–29	Waste Management Authority, Pirkanmaan Jätehuolto Oy
Separate collection of textile waste will be increased	166. Exploring the introduction of weight-based waste fees and, where possible, introducing them in the region.	2021–25	Waste Management Authority, Pirkanmaan Jätehuolto Oy
Construction waste sorting will be boosted	167. An analysis of the options available for organising waste management services will take the form of a life-cycle assessment in order to assess the environmental impact of the different solutions.	2020–29	Pirkanmaan Jätehuolto Oy
	168. Regional reception points for separate collection of textile waste will be organised by 2023.	2021–25	Pirkanmaan Jätehuolto Oy
	169. The waste contracts, waste facilities, sorting practices, guidance, shortcomings and needs of city-owned properties will be mapped. Waste-sorting opportunities will be enhanced in city-owned properties.	2021–25	Real Estate and Housing, Pirkanmaan Jätehuolto Oy, Tampereen Tilapalvelut Oy
	170. Waste management collection options and their space needs (building-specific collection, neighbourhood and block collection, pipeline system) will be taken into account in land-use planning at an early stage	2020–29	Detailed Planning, Pirkanmaan Jätehuolto Oy
	171. The city's construction sites will organise separate collection of waste by waste type, avoiding the generation of mixed construction waste. City infrastructure procurement will require contractors to have an operational system for waste management and define responsibilities.	2020–21	Construction and Maintenance of Urban Environment, Tampereen Infra Oy, Sustainable City
	172. The possibilities of organising local and block collection in existing residential areas will be investigated as separate collection obligations become more stringent.	2021–25	Pirkanmaan Jätehuolto Oy, Building Control Department Transport System Planning Green Areas and Storm Water Management
	173. Waste collection points will be increased in ports and waste sorting in ports will be improved.	2020–21	Construction and Maintenance of Urban Environment
Emission reduction	●●○○○		
Cost estimate	●●●●○		
Other benefits	• Cost savings through more efficient recycling and better use of materials		

EXAMPLES AND IMPACT ASSESSMENTS

163. and 164.

Cost estimate: Effects of improving waste management regulations

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 163	0	12,000	12,000
Measure 164	0	13,000	13,000
Total	**0**	**25,000**	**25,000**

Net present value of the programming period

EUR 20,000,000

Figure 57: *Operating expenses for the expansion of separate collection during the programming period. The cost estimate includes increasing Pirkanmaan Jätehuolto Oy's separate collection for plastic, metal, glass and cardboard waste (measure 163) and organic waste (measure 164). The discounted net present value of the measure for the programming period is also presented. The cost estimate is based on Pirkanmaan Jätehuolto Oy's data. The cost estimate will take into account that the data is indicative and the reference year is 2017.*

Measure package 5.2.	Circular economy	Timetable in council terms	Responsibility
DESCRIPTION **Circular economy business areas will be developed in Tarastenjärvi and Kolmenkulma** **A biogas plant will be built and waste collection vehicles will switch to using biogas** **The Tampere region central treatment plant will exploit the energy content of sludge** **Hiedanranta will developed urban circular-economy solutions**	174. The Tarastenjärvi area will be developed as a recycling park, where demolition waste from buildings, vehicle parts, wood waste, metals and plastics, for example, will be used more efficiently.	2020–21 2021–25	Business Unit, Business Tampere Oy
	175. The Kolmenkulma Eco-Industrial Park, which is a joint project between Tampere, Nokia and Ylöjärvi, will be developed. The area will be developed with a cleantech focus, maximising cooperation between businesses for the purposes of increasing material and energy efficiency, decreasing environmental burden and promoting the development of joint eco-friendly approaches.	2020–21 2021–25	Business Unit, Business Tampere Oy
	176. Pirkanmaan Jätehuolto Oy will build a biogas plant in Koukkujärvi, and the biogas produced will be used as transport fuel, or it can be used in the production of electricity and heat. The material generated in the process will also be used as a soil improver that can be further processed into various fertiliser products.	2020–21	Pirkanmaan Jätehuolto Oy
	177. Waste collection vehicles will switch to using biogas.	2020–21	Pirkanmaan Jätehuolto Oy
	178. Tampereen Seudun Keskuspuhdistamo Oy will build the Sulkavuori Central Treatment Plant. The sludge generated at the treatment plant will be treated in a biogas plant under construction, and the biogas recovered will be used with a good overall efficiency to meet the electricity and heat needs of the central treatment plant. Approximately 50% self-sufficiency for electricity and 100% self-sufficiency for heat will be achieved through the use of biogas.	2020–21 2021–25	Tampereen Seudun Keskuspuhdistamo Oy
	179. As part of the construction of Hiedanranta, a solution will be developed for the removal and utilisation of the zero-fibre sludge at the bottom of Lake Näsijärvi as energy and/or material on an industrial scale.	2020–21 2021–25	Hiedanranta Development Programme, Hiedanrannan Kehitys Oy
	180. Urban solutions based on the circular economy for sanitation and food production, such as dry toilets, algal biomass cultivation and urban and vertical farming will be promoted. Solutions will be developed and piloted in Hiedanranta, for example in the the Kieppi project.	2020–29	Hiedanranta Development Programme, Hiedanrannan Kehitys Oy, Sustainable City
	181. A business model will be developed whereby the soil disposal areas of Rusko and Myllypuro will be developed into circular economy hubs. (Recycling of stone materials and other materials used in construction.)	2020–21	City Maintenance of Urban Environment
	182. An operating model will be developed for recycling materials and supplies left over from the city's construction sites for reuse.	2020–21 2021–25	Construction and Maintenance of Urban Environment, Tampereen Infra Oy
	183. Developing the circular economy as an employer by means of the Kierto project, for instance. Companies will be supported in developing new business models based on the circular economy. Circular-economy activities and related support employment will be developed within the city organisation. Employment services will develop a system that enables efficient circulation of city movables between locations through an e-commerce application.	2020–21	Employment services
Emission reduction	●●●○○		
Cost estimate	●●●●●		
Other benefits	• Cost savings through more efficient recycling and better use of materials • Development of new innovations and local businesses • Improving the state of the water system • Enabling city growth		

EXAMPLES AND IMPACT ASSESSMENTS

178.

Cost estimate: Central treatment plant

	Investments (EUR 1,000)	Operating expenses (EUR 1,000)	Total (EUR 1,000)
Measure 178	242,000	0	242,000
Total	**242,000**	**0**	**242000**

Net present value of the programming period

EUR 39,000,000

Figure 58: *Investments in the Sulkavuori Central Treatment Plant during the programming period. The discounted net present value of the measure for the programming period is also presented. The treatment plant is already under construction and will be completed in 2024. The cost estimate is based on the data of Tampereen Seudun Keskuspuhdistamo Oy.*

Measure package 5.3.	Sustainable consumption	Timetable in council terms	Responsibility
DESCRIPTION **Digital customer services and tools will reduce the need for travel, improve use of space and reduce material consumption** **Shared use of goods will be increased**	184. Digital customer services will be increased with the aim of improving customer service and productivity as well as material saving, energy saving, reducing travel needs and improving the efficiency of space use. Examples: In Social Services and Health Care, digital services, such as the Omaolo service, electronic appointment booking, counselling chat service, remote appointments, remote interpretation and home care video calls, will be increased. In employment services, clients' video appointments will be increased. Clients' need for mobility will also be reduced with digital services in the service area of the urban environment. For example, the property formation unit's proceedings can be held online.	2020–21 2021–25	ICT, service areas, Smart Tampere
The carbon footprint of the increasing use of information technology will be reduced	185. Digital tools will be used to reduce unnecessary work mobility. Teleworking will be increased in all suitable activities. Examples: In Growth, Innovation and Competitiveness Services, efforts will be made to replace a large number of physical meetings with online meetings. The aim is for personnel to work at least one teleworking day a week in the positions for which teleworking is appropriate. Social Services and Health Care will map mobile workstations and equip them on premises around the city and communicate on the operating model to employees.	2020–21 2021–25	ICT, service areas, Smart Tampere
	186. Digitalisation will help reduce the consumption of paper and other materials. Offices will increase the sharing of printers and other equipment. Unnecessary paper printing will be avoided and eco-certified paper used. Personnel will switch off their computer and display when not using them. Electronic calendars will be used.	2020–21	ICT, service areas, Smart Tampere
	187. The carbon footprint of digitalisation and ICT use will be reduced through the implementation of the Green Digital Charter commitment and the development of energy-saving digital approaches.	2020–29	ICT
	188. The sharing and reuse of goods will be increased to achieve savings in procurement and more efficient use of goods. Examples: Museums will increase the reuse and sharing of exhibition structures and storage between museums. A market for recycling educational materials will be organised at the adult education centre in autumn. Upper secondary school textbooks, for instance, will be recycled through social media channels and by the student body. Tampere Vocational College Tredu will host a permanent book exchange market. Libraries will clarify the process of discarding library material and open it to the public. Exercise services will introduce a needs management system that can reduce overlapping procurement and extend the service life and versatility of sports equipment.	2020–29	Service areas, Tampere Vocational College Tredu
Emission reduction	●●○○○		
Cost estimate	●○○○○		
Other benefits	• Cost savings • Increase in the independent activities of urban residents		

Measure package 5.4.	Meals	Timetable in council terms	Responsibility
DESCRIPTION **Pirkanmaan Voimia Oy will increase the offering of vegetarian food and reduce food waste** **Culture and Leisure Services events will serve vegetarian options equally to others** **Day-care centres and schools will increase the share of vegetarian food** **Upper secondary schools will serve vegetarian food first on the line**	189. Pirkanmaan Voimia Oy will develop its business in a carbon-neutral direction. Voimia will calculate its emissions balance in 2020 and make a phased roadmap to reduce emissions by 2030. The roadmap will include, among other things: • Food services organised by Voimia will increase the supply of vegetarian options for children's and young people's meals, food services for Social Services and Health Care and staff meals. Product development will increase the attractiveness of vegetarian food and the share of vegetables and other climate-friendly ingredients in different dishes (2020–2025). • Voimia will seek the Nordic Swan Ecolabel for catering services to complement its Nordic Swan Ecolabel for cleanliness services (2026). • Voimia will centralise food production and reduce logistics emissions through the Voimian Pata production kitchen (2022–23).	2020–29	Pirkanmaan Voimia Oy
	190. Voimia sites will reduce food waste in meals of all customer groups, explore new opportunities for the utilisation of waste food and make the best possible use of potential waste food.	2020–21	Pirkanmaan Voimia Oy
	191. Vegetarian food will be presented as an equal option alongside other food in the culture and leisure services' own restaurant services, camps and events. Disposable tableware should be avoided and, if necessary, biodegradable tableware should be used. Efforts will be made to reduce the amount of food waste and to consider the possibilities of forwarding food waste to charity in future. Re-tendering of café and restaurant services will include in the criteria an environmental aspect and require service providers to adopt ecological practices, Fairtrade products and comprehensive vegetarian options.	2020–21 2021–25	Culture and Leisure Services
	192. In Education and Learning Services, the share of vegetarian food will be increased to two vegetarian meals per week in cooperation with the food service provider. Food waste will be reduced by exploring the possibilities of utilising food waste, such as resale, in cooperation with the food service provider. A joint campaign will be organised with Voimia to reduce the amount of food waste.	2020–21	Education and Learning Services
	193. Upper secondary schools will organise a food waste week and promote the reduction of food waste through information and regular measurements. Surplus food will be sold in the afternoon and served the following day. Vegetarian food will be served as the first option on the line.	2020–29	Upper secondary school services
	194. Tampere Vocational College Tredu's units will develop practices and information in cooperation with food service operators in order to increase the popularity of vegetarian meals and to reduce food waste.	2020–21 2021–25	Tampere Vocational College Tredu
	195. In Social Services and Health Care, ecological alternatives, or vegetarian and organic foods, will be increasingly emphasised in workplace catering and services. Service provider agreements will require daily vegetarian options in lunch restaurants and taking climate impacts into account in general. Campaign weeks will remind of the impact of choices on climate and health. Attention will be paid to loss, and the staff will be given more opportunities to buy surplus food from the cafeteria.	2020–29	Social Services and Health Care
	196. The city's meetings, conferences and events will be catered with the lowest possible carbon footprint.	2020–29	Group administration, service areas
Emission reduction	●●●○○		
Cost estimate	●●○○○		
Other benefits	• Health effects • Image benefits • Economical savings due to reduced food waste		

Measure package 5.5.	Procurement	Timetable in council terms	Responsibility
DESCRIPTION **Gradually tightening criteria will be set for climate-relevant procurement** **The implementation of climate and environmental criteria will be monitored in procurement, and the competence of those responsible for procurement will be developed**	197. The procurements that are most significant from the point of view of climate and other environmental impacts will be identified in order to help reduce adverse impacts in their design and implementation. Consideration of life-cycle impacts and the definition of environmental criteria will be improved in the most climate-relevant procurement.	2020–29	Service areas, Sustainable City, Tuomi Logistiikka Oy, Strategy and Development
	198. Procurement will lay down criteria for material efficiency, the use of recycled materials, the service life and repairability of the product and the recyclability of the product or its components after use. In particular, the procurement of energy, transport services, public transport services, vehicles, construction, equipment, machinery and food services will be subject to progressively stricter requirements, for example in regard to energy efficiency, fuel consumption, renewable energies and/or carbon footprint.	2020–29	Service areas, Sustainable City, Tuomi Logistiikka Oy, Strategy and Development
	199. The expertise of those responsible for procurement will be improved in regard to climate, energy efficiency and other environmental aspects through training, networking and advice.	2020–29	Sustainable City, Tuomi Logistiikka Oy, Strategy and Development
	200. The use of environmental criteria in tendering procedures in connection with the reporting of the city's activities and finances will be systematically monitored. More detailed information will also be collected on energy efficiency, vehicle fuel consumption and renewable energy criteria.	2020–29	Strategy and Development, Sustainable City, Tuomi Logistiikka Oy
	201. Cooperation with other cities and expert organisations on sustainable procurement themes will be increased.	2020–29	Sustainable City, Tuomi Logistiikka Oy
	202. In the procurement of Social Services and Health Care, attention will be paid to the sustainability of equipment, energy consumption, the ecology of materials and recyclability. Materials, supplies and goods will aim at avoiding waste (for example, pharmaceutical warehouses, KÄTSY warehouses of the goods shelving service, freely distributed medical supplies, assistive devices).	2020–29	Social Services and Health Care
	203. Education and Learning Services will explore the opportunities of testing the Green Deal contracts of the Ministry of the Environment in procurement. The aim is to promote climate change mitigation and the circular economy through procurement.	2020–21	Education and Learning Services
Emission reduction	●●●○○		
Cost estimate	●●○○○		
Other benefits	• Health effects • Image benefits • Economical savings due to reduced food waste		

Measure package 5.6.	Raising environmental awareness	Timetable in council terms	Responsibility
DESCRIPTION **The carbon-neutrality goal is a cross-cutting theme in different service areas of the city** **The principles of sustainability will be introduced into the criteria for assistive activities** **An operating model for a sustainable future will be implemented in day-care centres and comprehensive schools** **Climate issues will be a key part of the content of teaching in upper secondary schools and vocational studies** **Eco-support activities will be developed and urban climate campaigns and sustainable development events organised**	204. In Social Services and Health Care, climate issues will be taken into account in communications and training. The Social Services and Health Care management team (Sote-jory) will decide on a target for the service and annual plan that supports carbon neutrality. This way, the theme will be included in management and communications. Thematic weeks will be organised to encourage climate-friendly action.	2020–29	Social Services and Health Care
	205. In their communications, Culture and Leisure Services will express their commitment to the city's carbon-neutrality goals and promote sustainability through their activities. The situation of those in charge of sustainable development will be checked in each work unit. Their role will be strengthened and joint events organised for them. Sustainable development issues will be widely included in orientation materials. Staff working with children and young people will be trained to discuss sustainable development themes with clients and to integrate the theme into everyday work. Events, exhibitions, camps, youth work, library, adult education centre lectures and courses will highlight sustainable development themes. Compliance with the principles of sustainable development will be included in the criteria for assistive activities.	2020–29	Culture and Leisure Services
	206. Education and Learning Services will implement the Model for the implementation, monitoring and evaluation of the plan for a sustainable future in both early childhood education and basic education.	2020–29	Education and Learning Services
	207. In upper secondary schools, climate and environmental competence based on research data will be an integral part of the content of several upper secondary school subjects. Teachers will be encouraged to seek further training on climate change issues. Climate issues will be actively integrated into education (e.g. the ilmasto.fi climate course, LUMA2020 developer school activities, autumn 2020 Climate Day, My2050 experience game, Nomad circular economy path, Climate University cooperation). The topics of school events and thematic days will include sustainable development and ecology. The reduction of unnecessary consumption (e.g. Black Friday counter campaign Free Hugs) and giving of intangible gifts will be encouraged. Awareness will be raised by informing students, teachers, guardians and collaborators about climate action.	2020–29	Upper secondary school services
	208. Tampere Vocational College will create a sustainable operating culture throughout Tredu, such as common operating models for waste sorting, electricity and water consumption monitoring, double-sided printing, more efficient use of electronic signatures, electronic archiving, staff training and communication. Sustainable development will also be introduced into educational content, including an optional course in sustainable development, e-learning, immigrant education, working life cooperation, Commitment 2050, Sustainable Development Week and project themes such as the circular economy.	2020–29	Tampere Vocational College Tredu
	209. The competence of the city's personnel, supervisors and management in sustainable development and climate issues will be developed using the eco-support model and other training courses.	2020–29	Sustainable City, HR
	210. The city will promote the sustainable consumption by residents through various campaigns, such as the Climate Hero campaign and the annual Green Week, Earth Hour, Climate Week, Mobility Week and Energy Saving Week. Environmental and energy saving advice for residents will be organised through Ekokumppanit Oy.	2020–29	Sustainable City, Ekokumppanit Oy
	211. Pedagogical competence in sustainable development will be increased by supporting Tampere University's professorship in environmental pedagogy and its goals in 2019–2021.	2020–21	City attractiveness unit
Emission reduction	**Emission estimates cannot be made**		
Cost estimate	●●○○○		
Other benefits	• The economic and social impact of sustainable development in addition to ecological effects. • Image benefits		

Measure package 5.7.	Sustainable business and events	Timetable in council terms	Responsibility
DESCRIPTION **Climate business ecosystems will be developed** **City projects will be opened as development platforms for low-carbon business** **Outdoor event venue rental policy will be revised to support sustainable development** **Event-goers will receive the option of a public transport ticket**	212. The corporate ecosystems of the climate business will be developed in the Tampere region. In the Tampere region economic strategy, climate action is one of the focus areas. The growth of climate movement activities will be enabled by opening city projects as development platforms (such as Hiedanranta).	2020–21 2021–25	Growth, Innovation and Competitiveness Services, Business Tampere Oy, Hiedanranta Development Programme, Hiedanrannan Kehitys Oy, Smart Tampere
	213. The city's economic policy and the Smart Tampere programme will support projects and operating environments that promote the productisation, commercialisation and market access of low-carbon product and service ideas of SMEs.	2020–21	Growth, Innovation and Competitiveness Services, Business Tampere Oy, Smart Tampere
	214. The organisation of responsible events will be promoted by bringing event management guidelines in line with the principles of sustainable development. The management of platforms and outdoor venues will be improved by reforming the renting policy for outdoor event venues in line with sustainable development.	2020–21	City attractiveness unit Business Tampere Oy, Visit Tampere Oy,
	215. A chain of participation and mobility will be created that favours public transport by providing a free public transport ticket for event-goers.	2020–21	City attractiveness unit, Public Transport
	216. Visit Tampere Oy will seek environmental certification and also help and guide partner companies to seek certification (such as the Sustainable Travel Finland label).	2020–21	Visit Tampere Oy
	217. The Climate Partnership operating model will be launched, whereby the city invites companies and communities to implement the Carbon Neutral Tampere goal in cooperation and in ways that are appropriate for each of them.	2020–21	Sustainable Tampere, Business Tampere Oy
Emission reduction	**Emission estimates cannot be made**		
Cost estimate	●●●○○		
Other benefits	• The economic and social impact of sustainable development in addition to ecological effects. • Facilitating new business • Image benefits		

EXAMPLES AND IMPACT ASSESSMENTS

213. Smart Tampere programme projects

Smart Tampere Development Programme low-carbon projects 2020:

Quick experiments:

- Kauppi area carpools
- Kintulammi last mile solutions
- Making use of Viinikka's smart lighting network
- My2050 climate game

Platforms:

- Hiedanranta of innovation
- Vuores timber construction area
- Viinikka IoT test platform
- Drone test platform in Hiedanranta

Projects:

- Ecosystem of guidance – information screens, last mile solutions, mobile applications
- CityIoT – smart lighting and new ways to gather real-time information about the urban environment
- AREA21 – new energy counselling services for residents and housing companies
- Energy-smart cities EKAT – energy-efficient service buildings through property data and new operating methods
- STARDUST – smart district heating, zero-energy areas and the promotion of electric transport
- KIEPPI – circular economy pilots in Hiedanranta and development of an entire circular economy district model
- Timber construction programme – Vuores will have the largest set of wooden blocks of flats in Finland
- Urban spaces 24/7 – city spaces made available to everyone with new digital applications
- Reform of public transport information and payment system – smooth customer service with new payment methods and information displays

Figure 59: *In the Energy Smart Cities project, the six largest Finnish cities are developing energy-efficient buildings and cities into platforms for the development of smart energy solutions.*

THEME 6 SUSTAINABLE URBAN NATURE

Benefit target 2030: Urban nature and urban structures bind carbon, and preparations have been made for climate change

DESCRIPTION	The aim is to keep forests and the green structure of the urban environment functional and vibrant even as the city grows. This will trap carbon from the atmosphere and mitigate climate change. In addition to the carbon sink and carbon storage impact, forests and green structures provide a wealth of other benefits, such as habitats for different species, well-being and a pleasant environment for urban residents, as well as helping to adapt to climate change through stormwater regulation and cooling effects. Forests owned by the city (about 7,500 hectares, of which about 7,000 hectares in Tampere) account for about 20% of all forests in the city area. The majority of the city-owned forests are located around housing, used for outdoor exercise and recreation, or they are protected areas. There are just over 1,000 hectares of commercial forests. The city's forests have a large carbon stock of trees and soils, which corresponded to about six years' total emissions in 2019. The stock will grow by about one million tonnes of CO2 by 2030. According to Tapio Oy's report, the carbon sink of the forests and soil owned by the city is approximately 60,000 tonnes of carbon dioxide per year. The carbon sink of the forest has grown until the 2020s thanks to the city's forest management principles. However, the sink will decrease already in this decade as forests age and their growth slows down. Forest management aims to increase the diversity and varied structure of forests. This will support the recreational use of forests and also prepare for global warming, which increases the risks of plant diseases. The carbon sink of forests and urban green will be strengthened in the management of both forests and green belts.
Target 2030	• Greenhouse gas emissions from green construction have been reduced by 80%. • The carbon sink effect of the forests and the urban environment in the Tampere region will cover a significant part of the emission compensation needs. • The carbon sink of city-owned forests (growing stock and soil) will cover about 20% of the emission compensation needs under the 2030 target. • Greenhouse gas emissions not captured by carbon sinks will be offset in a separately defined way.
Indicators	• Annual growth and drain of city-owned forests (m^3) • Carbon sink effect of forests in the Tampere region (CO_2 t) • Number of green spaces in master plans and town plans in the inner-city area (m^2 per resident) • Ecosystem services provided by green spaces • Emission effect from green construction
Starting point	• Tampere Strategy 2030 • Sustainable Tampere 2030 guidelines

Situational picture: Realisation of indicators

Indicator	Unit	2014	2015	2016	2017	2018	2019
Share of recreational areas in the total inner-city Detailed Planning area	%	26.4	26.5	26.2	26.2	26.2	26
Annual growth of the city's forests	m^3						47,451
Annual drain of the city's forests	m^3						20,011
Amount of inner-city green belts in the town plan and master plan	m^2 per resident					220	219

EXAMPLES AND IMPACT ASSESSMENTS

Figure 60: *The Tampere city region comprises approximately 7,000 hectares of urban forests. Forest management aims to increase diversity and support the recreational use of forests and carbon sinks. Image source: Visit Tampere Oy/Laura Vanzo.*

Measure package 6.1.	Carbon sinks of forests	Timetable in council terms	Responsibility
DESCRIPTION **Carbon sinks are reinforced in the city's forest management** **Forests' adaptation to climate change will be strengthened**	218. The carbon sink effect will be considered in the city's forest management model with the aim of strengthening carbon sinks in the city's forest management. Uneven-aged forest management is favoured in the forests located around housing and those used for outdoor recreation and hiking. Commercial forests are managed and used sustainably. Nature conservation areas are operated in line with the management and use plans approved by the Centre for Economic Development, Transport and the Environment. An updated forest management operating model will be approved by the Housing and Property Committee in autumn 2020.	2020–21	Real Estate and Housing
	219. Carbon sequestration will be increased in suitable areas, by planting trees for instance. Not all open areas can be afforested due to natural, landscape and cultural values. Suitable sites will be mapped and plantings planned.	2020–29	Green Areas and Storm Water Management, Sustainable City, Real Estate and Housing, Tampereen Infra Oy
	220. The adaptation of forests to climate change will be strengthened: The aim of forest management is to diversify the tree species and age structure and to prepare for forest damage by maintaining the vitality and health of the growing stock.	2020–29	Real Estate and Housing
Emission reduction	**No emission reduction, enables emission compensation**		
Cost estimate	●●○○○		
Other benefits	• Positive ecosystem impacts • Well-being and a pleasant environment for city residents		

EXAMPLES AND IMPACT ASSESSMENTS

218. Development of forest carbon stocks and carbon balance

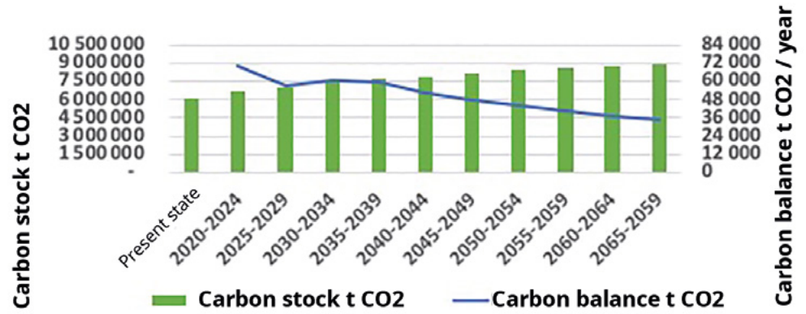


Figure 61: *The carbon stock of forests owned by the City of Tampere is currently 6 million tonnes of carbon dioxide. By 2030, the stock will increase by about one million tonnes. The carbon balance, which describes the amount of carbon sequestration in forests, is currently around 60,000 tonnes of carbon dioxide per year, but is projected to decrease in the coming decades as the city's forests age and growth slows down. Image source: City of Tampere.*

220. Forests' adaptation to climate change will be strengthened

Share of forest types of total area

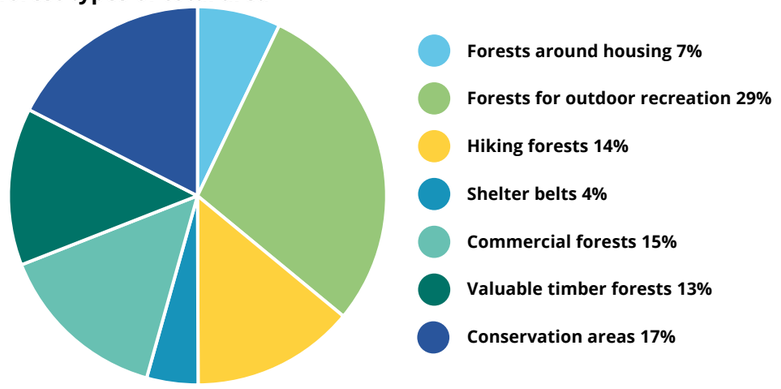


Figure 62: *The City of Tampere's forest management operating model describes the objectives for each forest type that guide management and use. The forest types respond to different needs of the residents for forest management. They also maintain natural variation.*
Image source: City of Tampere.

Measure package 6.2.	Urban green carbon sinks	Timetable in council terms	Responsibility
DESCRIPTION **Carbon sequestration of urban trees will be investigated and a target set for increasing the number of urban trees** **Sustainable local plant species will be favoured** **Nature conservation programme sites will be protected**	221. The Green Belt Programme will be updated (e.g. favouring sustainable, local, biodiversity-friendly and easy to manage species in plant species choices; tree species programme).	2020–21	Green Areas and Storm Water Management
	222. The i-Tree project will define urban green material and carbon sequestration and other ecosystem services for the selected research area in order to determine the current level and understand the value of urban trees. On the basis of this study, a target will be set to increase the number of urban trees.	2020–21	Green Areas and Storm Water Management
	223. The growing conditions of urban trees and the treatment of stormwater will be improved, including by building biocarbon substrates. Test sites will be constructed to monitor the results.	2020–21 2021–25	Green Areas and Storm Water Management
	224. The green efficiency of public areas will be promoted by developing new tools for the zoning process, such as a green factor and a city design manual.	2020–21	Green Areas and Storm Water Management
	225. A green roof pilot will be carried out, producing monitoring data.	2020–21 2021–25	Detailed Planning, Five-star City Centre Development Programme, Green Areas and Storm Water Management
	226. The protection of nature conservation programme sites will be prepared.	2020–29	Sustainable City
Emission reduction	**No emission reduction, enables emission compensation**		
Cost estimate	●●○○○		
Other benefits	• Positive ecosystem impacts • Well-being and a pleasant environment for city residents		

EXAMPLES AND IMPACT ASSESSMENTS

226. Tampere nature conservation areas

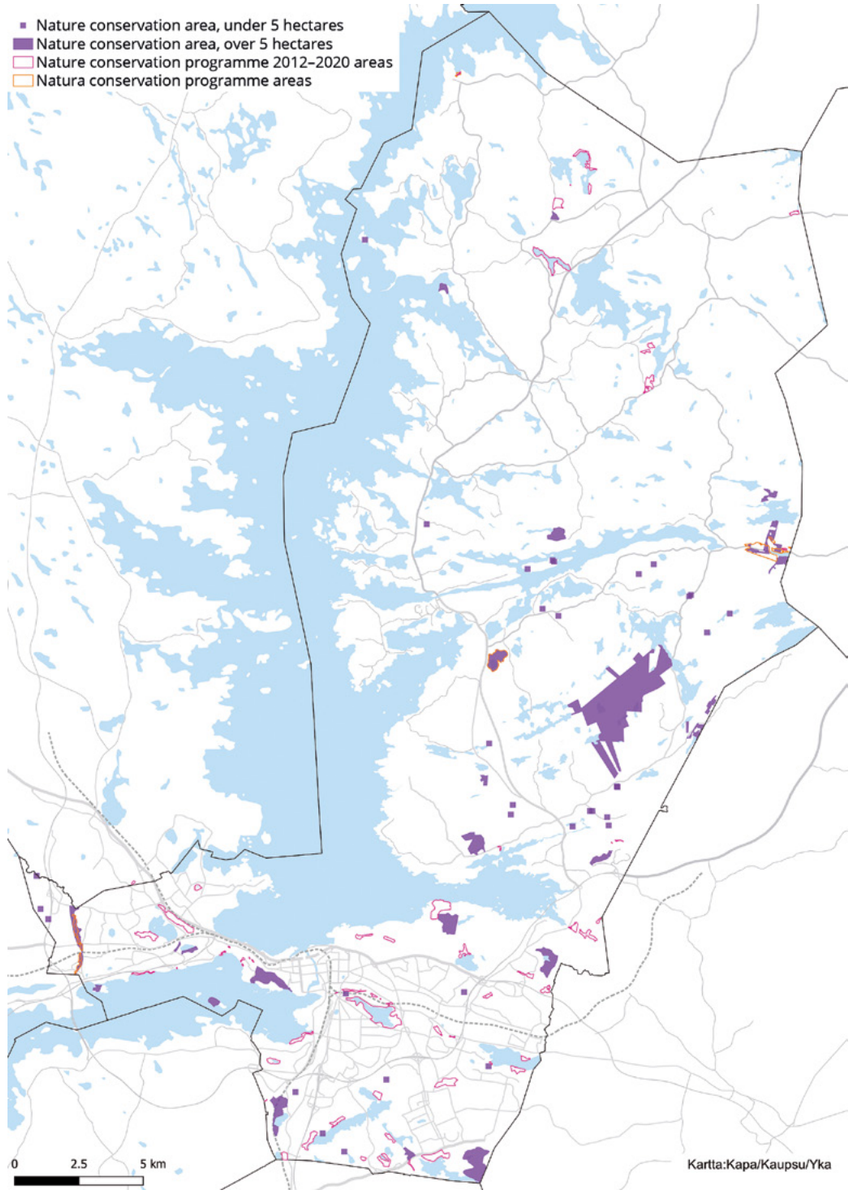


Figure 63: *Tampere nature conservation areas, sites under the nature conservation programme that have not yet been protected, and areas covered by the Natura conservation programme. The delimitation of the completed nature conservation areas is based on the inner-city master plan, council term 2017–2021, and the draft strategic master plan of Northern Tampere. Due to the nature of the master plan, the limitations have been generalised. In addition to traditional protection under the Nature Conservation Act, conservation through planning, management classification as valuable timber forests and, in individual cases, other appropriate means will be used to safeguard the nature values of sites under the nature conservation programme. Image source: City of Tampere.*

Measure package 6.3.	CO_2 emissions from landscaping and stormwater area construction	Timetable in council terms	Responsibility
DESCRIPTION **Sustainable environmental construction guidelines will be implemented in green construction** **Low-emission machinery will be adopted** **Carbon neutral green construction will be developed**	227. Understanding of greenhouse gas emissions from blue-green construction will be increased through training (e.g. pipe material choices, fleet, soil, construction, maintenance). Implementation of the National Sustainable Environmental Construction (DOMESTIC) Guidelines in the Green Areas and Storm Water Management Unit. A pilot under the Kesy operating model will be carried out in the green belt of the Niemenranta 3 town plan.	2020–21 2021–25	Green Areas and Storm Water Management, Sustainable City
	228. A report will be prepared on low emission maintenance methods (fleet, waste management, logistics, winter maintenance).	2020–21	Green Areas and Storm Water Management, Construction and Maintenance of Urban Environment, Tampereen Infra Oy
	229. Low emission machinery will be introduced in maintenance and construction.	2020–21 2021–25	Green Areas and Storm Water Management, Tampereen Infra Oy
	230. A pilot project will be implemented for the planning of Green Areas and Storm Water Management areas with the aim of minimising carbon emissions. Carbon emissions will be calculated and form the basis for choosing design solutions.	2020–21 2021–25	Green Areas and Storm Water Management, Sustainable City
Emission reduction	●●○○○		
Cost estimate	●●○○○		
Other benefits	• Positive ecosystem impacts • Well-being and a pleasant environment for city residents		

EXAMPLES AND IMPACT ASSESSMENTS

230. Development of natural stormwater management systems

Figure 64: *Natural stormwater management systems are being actively developed in Tampere. For example, one of the largest stormwater management areas in Finland, which also serves as a recreational area for residents, has been built in Vuores. Water quality and flow are monitored by automatic measurements throughout the year. Measurements provide information on the ability of the current stormwater management system to purify stormwaterr and reduce flows. The Urban Nature Labs project will pilot urban stormwater management through nature-based systems in collaboration with city residents throughout the city, for example in Hiedanranta.*
Image source: City of Tampere.

Measure package 6.4.	Climate change adaptation measures	Timetable in council terms	Responsibility
DESCRIPTION **A climate change adaptation plan and stormwater plan will be prepared**	231. Climate change adaptation measures focusing on the most important risk areas for the city will be planned and implemented.	2020–21	Sustainable City, Strategy and development
	232. The stormwater plan will be updated, flood risks prepared for and the waters directed as rainfall increases.	2020–21	Green Areas and Storm Water Management
	233. Space allowances for climate change adaptation structures will be taken into account in plans: stormwater, snow storage, multi-purpose areas and water reserves.	2020–29	Green Areas and Storm Water Management, Comprehensive Planning, Detailed Planning, Construction and Maintenance of Urban Environment
	234. Regional and cooperation will be developed between different actors in adapting to climate change.	2020–29	Sustainable City
Emission reduction	**No emission reduction**		
Cost estimate	●○○○○		
Other benefits	• Environmental safety improves and risks are reduced • Adapting to a changing climate can bring savings in the future		

EXAMPLES AND IMPACT ASSESSMENTS

231. Impact of climate risks in Tampere

Sector	Impact	Likelihood	Level of impact	Timetable
Buildings	1. Damage and associated economic damage caused by heavy rainfall, stormwater and storms 2. Stress on structures and moisture load	●	!!	▶
Transport	1. Damage to transport and transport infrastructure caused by storm damage 2. Public transport delays 3. Increased rainfall and snow levels and resulting increased accident risk 4. Reduced visibility 5. Impact of temperature fluctuations on transport infrastructure	●	!!	▶
Energy	1. Distribution network damage 2. Increased power outages 3. Increased need for a decentralised energy system	●	!!!	▶
Water	1. Increase in nutrient loads in water systems 2. Changes in water levels in bodies of water 3. Impairment of water recreational value 4. Decrease in water hygiene 5. Changes in groundwater formation and quality 6. Overflows from treatment plants	◉	!!!	▶▶
Land use planning	1. Impact of stormwater on the building stock, land-use planning and Detailed Planning	●	!!	
Agriculture and forestry	1. Forest damage and resulting economic damage caused by storms and snow masses 2. Heavy rainfall and flood damage to cereal crops, lodging of grain crops 3. Increased risk of run-off and required adaptation and investment 4. Plant diseases and pests and possible new invasive species	●	!!!	▶
Environment and biodiversity	1. Changes in urban ecosystems 2. Deterioration of aquatic ecosystems due to increased nutrient run-off 3. Non-native and invasive species and the spread of plant diseases	●	!!!	▶
Health	1. Impact of increased rainfall and extreme weather on reduced physical activity 2. Effects of rainfall, storms and bad weather on people's mental health 3. Increase in zoonotic diseases 4. Water epidemics, sewage spills and disturbances in wastewater treatment plants that pollute groundwater, recreational and other domestic waters	◉	!	▶▶▶
Rescue services and emergency services	1. Increased number of alarm assignments	●	!!	▶
Tourism	1. The tourism sector is highly dependent on the weather. Awareness of weather-related challenges in the development of the sector (weather-independent activities).	●	!	▶▶▶

● Likely ◉ Possible ○ Unlikely

! Low !! Moderate !!! High

▶ Short term (0–5 years) ▶▶ Medium term (5–15 years) ▶▶▶ Long term (over 15 years)

Figure 65: *Impact of the highest level of climate risks on different sectors in Tampere, their likelihood, impact level and timetable. Source: City of Tampere Sustainable Energy and Climate Action Plan (SECAP report), 2019.*

THEME 6 SUSTAINABLE URBAN NATURE

Measure package 6.5.	Emission compensation	Timetable in council terms	Responsibility
DESCRIPTION **Remaining emissions will be offset with forest carbon sinks and other emission compensation methods** **Air travel compensation will be developed**	235. A plan will be established to offset emissions that cannot be reduced by 2030. The compensation methods to be investigated include carbon sinks for forests, green structures and timber construction, as well as the purchase of emission offsets elsewhere in Finland or abroad.	2025–29	Sustainable City
	236. The system of compensation for air travel by city employees and elected officials will be improved to better serve the purpose. Upper secondary schools will develop their own emission compensation for trips part of upper secondary school education. Compensation refers to the participation of students in a climate action or campaign, etc.	2020–21	Sustainable City, Upper secondary school services
Emission reduction	●●●●●		
Cost estimate	**Unknown**		
Other benefits	• The attractiveness of the urban environment • Ecosystem services • Economically efficient emission reductions		

5. SUMMARY: ARE THE MEASURES SUFFICIENT?

The carbon-neutrality goal requires active climate work

The Carbon Neutral Tampere 2030 Roadmap presents over 230 measures to be taken by the City of Tampere to achieve carbon neutrality by 2030. The measures have been compiled in dialogue between service areas and units. They have also been combined with measures taken by the city's public utilities and companies, as far as they were known. The city-owned companies will make their own roadmaps during 2020, and they will complement the city organisation's roadmap in this respect.

The roadmap includes a wide range of climate actions large and small. Some are major investments, such as the tramway, the conversion of the Naistenlahti Power Plant or the central wastewater treatment plant. Investments are always carried out for a number of reasons, in the roadmap they have been assessed from the climate impact point of view. It is important that the city's major investments contribute to the climate targets, even though the need for investment increases for other reasons, such as the city's growth, the end of life of old power plants or the need to develop water management. Large investments of this kind do not entail additional costs because of the roadmap. However, since they have a positive impact on the climate, they are also major climate actions – the roadmap features half a billion euros' worth of them.

There are many small individual measures in the roadmap of little cost or direct impact on climate emissions, but which serve as a good example and reinforce the growing river of change from small streams. These include purchasing electric cars or solar panels for the city, increasing the share of vegetarian food in schools and staff canteens, increasing recycling and the use of recycled materials, and timber construction.

Many of the roadmap measures have an indirect impact on climate emissions, enabling urban residents to live, use energy, move and use services in a sustainable fashion. Tampere is determined to guide the city's growth to city centres and along the trunk routes of public transport. The tramway will densify the city and make energy-efficient housing and car-free everyday life possible. Smooth mobility services, digital services and a well-functioning circular economy make it easier for residents to make sustainable everyday choices. The impact of these measures is significant, but it will only be visible in the longer term, and it is very difficult to assess its scope in advance.

This roadmap only describes the City of Tampere's measures to promote carbon neutrality. However, action is also needed from companies, communities and city residents, and a delightful amount of that has already been done. Achieving the goal will require major changes in many areas, such as abandoning oil heating, improving the energy efficiency of old buildings and changing the fuel sources of transport equipment and work machines. The City of Tampere invites companies, communities and residents to collaborate to implement a carbon-neutral city. Climate partnership is a concrete model of cooperation whereby partners choose suitable projects for themselves and implement them on a win-win basis.

According to the impact assessment of the roadmap, the city's measures will achieve a 72% reduction in greenhouse gas emissions by 2030. The assessment does not include the indirect emission reduction measures mentioned above. If they succeed and the climate partnership brings companies, communities and city residents to active climate work, it will be possible to achieve the 80% reduction required for carbon neutrality.

Additional efforts to achieve the carbon-neutrality goal should be taken for the following measures, in particular:

- **Improving the public transport service level**
- **Improving walking and cycling infrastructure**
- **Mobility management towards sustainable modes of transport**
- **Providing energy counselling for residents and housing associations**
- **Advancing the change to clean fuel sources in buses**
- **Implementing the Energy Efficiency Agreement for municipalities**

Achieving Tampere's ambitious carbon-neutrality goal requires a determined and long-term commitment from the entire city organisation to the carbon-neutrality goal. This goal must be integrated into the operational culture and taken into consideration annually when planning activities and budgets. In particular, further efforts are needed to promote sustainable transport and improve the energy efficiency of buildings.

The roadmap is to be updated regularly. It will provide an opportunity to assess the achievement of the goal and, if necessary, to step up measures. In connection with the update, it is also possible to examine the changes in the operating environment. For example, the development of alternative transport fuel sources and technologies is rapid, and solutions that are currently unknown may enter the market.

What will the implementation of the roadmap cost?

The costs of the measures in the roadmap have been estimated to the extent that this has been possible in practice. The cost estimate distinguishes between the budgetary impact of the city itself and of the companies. The net present value of the measures, allocated to the programming period 2021–2030, has also been calculated. This is because the life-cycle of many investments is much longer than the programming period. For some of the measures, it has also been possible to calculate the cost of emission reductions. Although the cost estimate is not exhaustive, it is the first of its kind in Finland and ground-breaking even internationally.

If one distinguishes from the estimated costs those which are not included in the city's financial plans or based on statutory requirements, the additional costs of the roadmap measures will amount to between EUR 87 million and EUR 94 million over the next ten years, or approximately EUR 9 million annually, discounted to the present value of approximately EUR 4 million.

Some of this can be covered by various forms of external financing, such as state aid (including the MAL4 programme) and client revenues, some by accrued savings and some by reorientation of activities. The roadmap does not comment on the financing of the measures; they will be proposed by the service areas in connection with the budget procedure.

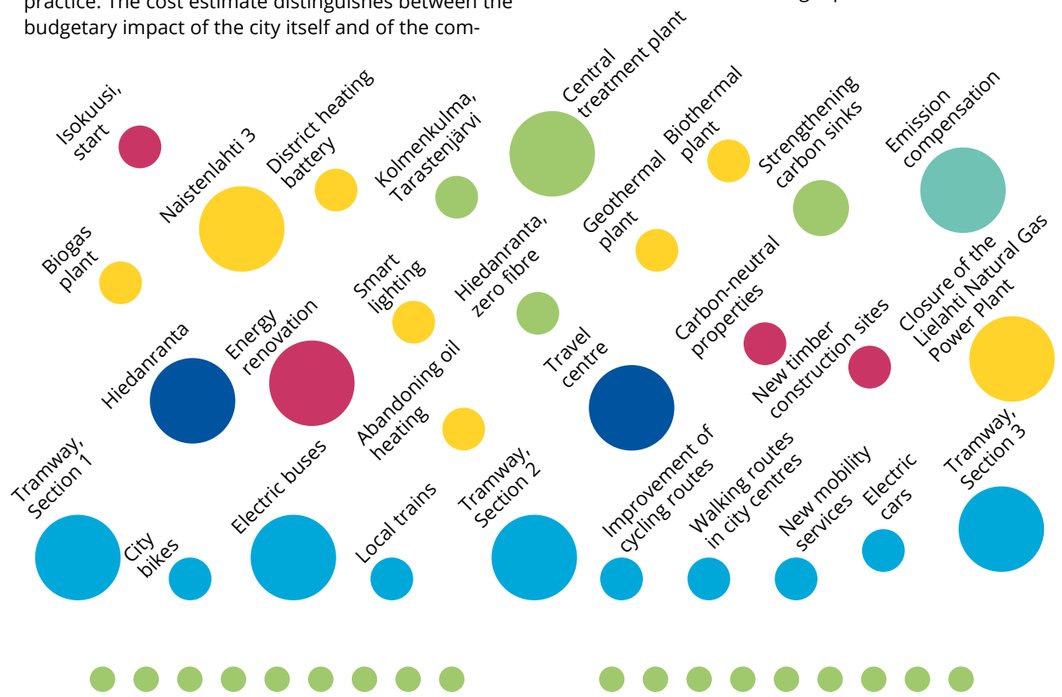
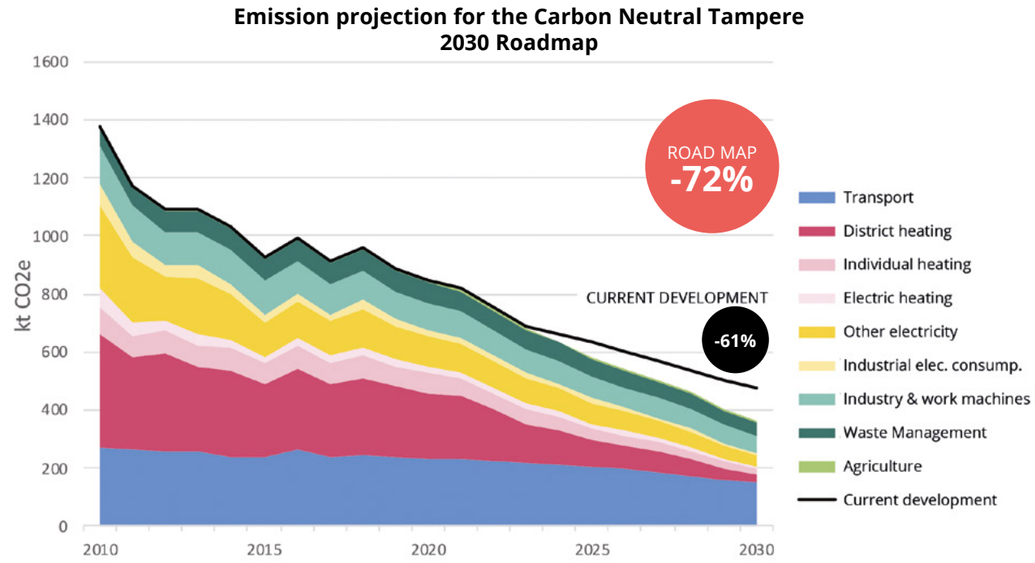


Figure 66: *Roadmap actions on the timeline. Large balloons represent large investments and emission reduction measures, medium-sized balloons represent smaller climate actions and small balloons represent changes in everyday practices.*

Roadmap emission estimate: action by the city alone is not enough



kt CO_2e	Year	Total	Traffic	District heating	Separate heating	Electric heating	Other electricity consumption	Industrial electricity consumption	Industry and work machines	Waste management	Agriculture
Realisation	1990	1,301	290	347	124	40	134	126	144	88	9
	2018	960	247	266	75	28	133	31	102	71	7
Forecast	**2030**	**366**	**150**	**27**	**19**	**10**	**40**	**7**	**56**	**51**	**6**
Target	2030	260	115	28	4	7	40	7	39	15	5

Figure 67: *Emission projection for the measures of the Carbon Neutral Tampere 2030 Roadmap by emission sector by 2030. The current development forecast includes the continuation of current trends in energy consumption, as well as national trends, which are hardly influenced by the municipality's activities, such as the decrease in the emission factor of national electricity production and the change in the fuel sources of transport. The sectoral targets are the same as in the climate budget of the City of Tampere budget for 2020.*

The Sustainable Development Unit, in collaboration with experts of different fields, has assessed the impact of the roadmap measures on the development of greenhouse gas emissions ("Forecast KT2030"). The assessment has taken as a benchmark the current pace and direction of change and, depending on the availability of data, the impact of national measures ("Business as usual"/"Forecast, current").

The measures, for which an impact can be identified, in the roadmap can achieve an emission reduction of around 72% by 2030. However, the full impact of all measures cannot be assessed yet.

The most important factor not yet assessed are in the transport sector the measures that affect the mobility choices of local residents. As a result, the emission reduction estimate for transport remains indicative for the time being.

Achieving the goal of carbon neutrality requires not only actions by the city, but also the broad participation of residents and businesses. Emissions from industry, logistics and oil heating must also be drastically cut. Developing sustainable mobility to be easier, faster and more attractive, in turn, also requires the participation of local residents.

Assessment of the roadmap for the main emission sectors

Reduction of *district heat* emissions are likely reach their target. It requires the local electricity company, Tampereen Sähkölaitos power utility not only to convert Naistenlahti Power Plant, but also to focus future investments on renewable energy as well as smart energy system solutions, as described on pages 76–79. A model as used by Tampereen Sähkölaitos, but adjusted to Tampere city's own population projection, as used to estimate the consumption of district heat in the future.

The model takes roughly into account the removal of buildings, moderate repair construction, new construction in line with population growth and shifts between heat sources. The KT 2030 calculation also estimates the widespread realisation of the energy saving potential of repair construction and the fact that only renewable fuel will be burned in the new boiler in Naistenlahti by 2030.

Forecast of climate emissions from district heating

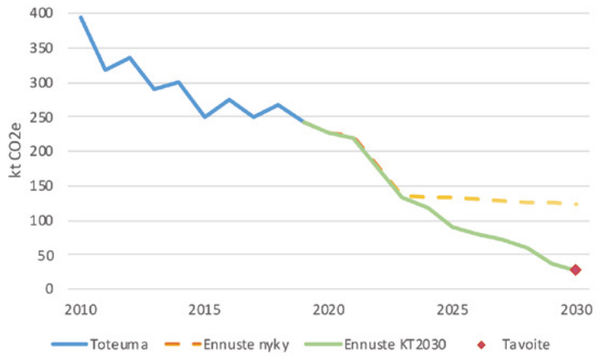


Figure 68: *The realised district heat emissions, the forecast with current development (including the boiler conversion in Naistenlahti) and the Carbon Neutral Tampere 2030 Roadmap development. The target is based on an emission vision, which is also reflected in the climate budget. The projection is about 1kt CO_2e below the target.*

The emissions target for other *electricity consumption, electric heating* and *industrial electricity consumption* will also be met if consumption continues to develop at the current rate. The consumption forecast is based on the current trend in consumption per capita, which is decreasing by about 40kWh per year, or by about one per cent. However, overall consumption is growing moderately with population growth. The reduction in emissions is therefore mainly due to a significant reduction in the national electricity emission factor, which is also influenced by the investments by Tampereen Sähkölaitos. Energy efficiency measures will keep growth in consumption under control.

Forecast of climate emissions of other electricity consumption

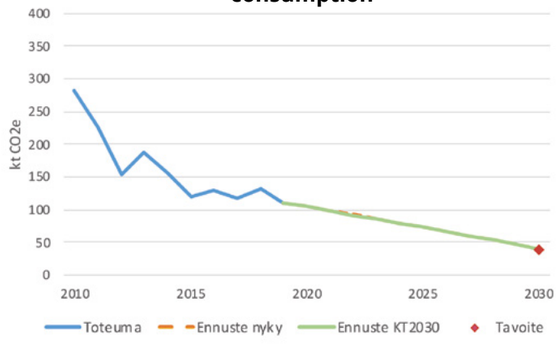


Figure 69: *The realised emissions from other electricity consumption, the forecast with current development (including the development of the national electricity emission factor) and development under the Carbon Neutral Tampere 2030 Roadmap. The target is based on an emission vision, which is also reflected in the climate budget. Current development differs only slightly from the forecast, the reduction in emissions reaches the target.*

The increase in heat pumps has taken into account current development, increasing the efficiency of repair construction and the replacement of oil heating.

Reducing *emissions from industry and work machines* as well as from *individual heating (oil heating)* to the target level requires additional measures in these sectors, especially in industry and at construction sites.

In addition, a significant investment in repair construction advisory services is essential in controlling emissions from the heating of buildings. It accelerates the reduction of emissions from oil heating, reduces uncertainty about the evolution of emissions from district heating production and keeps the growth of electric heating consumption under control.

The highest emissions from *waste management* are methane emissions from existing landfills, where no significant amount of waste has been deposited since 2016. Previous calculations overestimated the reduction in emissions, and therefore the target for 2030 is not being reached. Further calculations of future climate emissions from landfills are still under preparation. The Sulkavuori Central Treatment Plant will further reduce emissions from wastewater treatment. The impact assessment is still pending. Waste management also produces significant amounts of renewable energy and uses biogas. Their effects are reflected in energy production and consumption.

In the assessment of *transport* emissions, current methods can predict a reduction of about 100 kilotonnes of CO_2e compared to 2018, when the vision target is 35kt CO_2e more. The estimate does not take into account measures aimed at changing people's mobility behaviour. This reduction can therefore be increased by a modal shift in mobilty. However, current knowledge does not allow us to assess its direction or magnitude.

The traffic estimate includes all transport investments modelled for Tampere and the resulting change in generated traffic. The development in consumption of different fuel source is harmonised with the fuels assessment of the current master plan, which is based on national traffic models. Electric cars are expected to become more widespread, with 30% of private car kilometers driven by electric cars in 2030. Public transport will run entirely on low-emission fuel sources in 2030, in accordance with the public transport fuel sources assessment completed in early 2020. The changes taking place in fuel sources are largely dependent on action at national level, and there is also uncertainty about its implementation.

The fact that some of the measures are in the investigation phase also makes it more difficult to estimate the emissions from transport. The roadmap mentions, for example, the use of parking fees and the study of road tolls to guide the shift to sustainable modes of transport, but in the absence of more precise definitions, the impact cannot be assessed.

Ambitious measures are already under way in Tampere to increase the share of sustainable modes of transport, and they also feature significantly in the roadmap. As the modal shift is slow, these measures need to be taken decisively and communicated broadly in order to achieve the carbon-neutrality goal.

Forecast of climate emissions from traffic

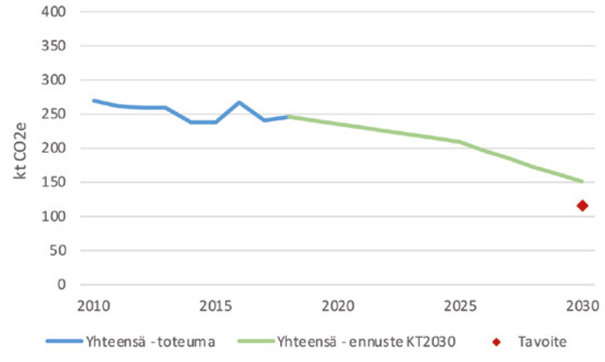


Figure 70: *Realised traffic emissions, as well as development under the Carbon Neutral Tampere 2030 Roadmap without measures affecting the modal shift (necessary data for assessment are unavailable). The target is based on an emission vision, which is also reflected in the climate budget. The current development could not be assessed as the necessary data have not been modelled. The assessment is based on traffic modelling carried out in connection with section 2 of the tramway. According to the forecast, results will fall around 35kt CO_2e short of the target.*

Roadmap costs for the city itself

Measure package	Measure	Total cost during the programming period (EUR 1,000)	Net present value in the programming period (EUR 1,000)	Investment (I)/ Operating expenses (K)	Emission reduction 2030 ($ktCO_2$)	Cost of emission reduction (EUR per tCO_2)
2.1 Tram transport (operation)	33	38,900	32,500	K		
2.2 Local-train transport (halts)	43	5,000	500	I		
2.2 Local-train transport (operation)	43	1,200	900	K		
2.2 Local-train transport (master plan)	44	50	50	K		
2.2 Local-train transport (ticket products)	45	400	380	K		
2.3 Bus transport (production agreement)	47	1,000	840	K		
2.3 Bus transport (fuel source change)*	48	-4,800–4,300	-3,700–3,400	I+K	11.0–24.6	-30–60
2.3 Bus transport (depot)	49	14,000	3,200	I		
2.4 Public transport service level (trunk line frequencies)*	51	5,000	4,200	K		
2.4 Public transport service level (trunk line acceleration)*	52	7,500	6,300	K		
2.4 Public transport service level (trunk line extension)*	53	1,000	840	K		
2.4 Public transport service level (demand-responsive public transport and customer experience)*	54, 55	3,000	2500	K		
2.4 Public transport service level (tariff policy)*	56	8,700	7,100	K		
2.4 Public transport service level (payment systems)*	57, 58	1,200	1,100	K		
2.5 Walking and cycling (city centre and regional centres)*	59	9,000	2,000	I		
2.5 Walking and cycling (main regional routes) *	60	25,500	5,300	I		
2.5 Walking and cycling (underpasses)*	61	18,000	3,900	I		
2.5 Walking and cycling (bicycle parking facilities)*	62	4,500	1,500	I		
2.5 Walking and cycling (bicycle parking spaces)*	63	1,000	250	I		
2.5 Walking and cycling (winter maintenance)*	64	1,000	800	K		
2.5 Walking and cycling (bicycle parking on city property)*	66	2,400	550	I		
2.6 Road transport (studies)	67, 68, 70, 74	160	140	K		
2.6 Road transport (charging stations on city property)	69	750	180	I		
2.6 Road transport (parking tariffs)*	71	-1,000	-760	K		
2.6 Road transport (change in fuel sources of city's cars)*	77	950–1,500	540–770	I	0.2–0.4	-20– -50
2.6 Road transport (change in fuel sources of city's cars)*	77	-700– -1,100	-560– -870	K		
2.6 Road transport (change in fuel sources of city's vans)*	77	1,000–3,400	490–810	I	0.2–0.6	-50– -90
2.6 Road transport (change in fuel sources of city's vans)*	77	-800– -1,300	-630– -950	K		
2.7 Transport equipment and work machines (renewable diesel in work machines)*	80	280	250	K	2.1	20
2.8 New mobility services (city bikes)	81	2,500	2,200	K		
2.9 Mobility management (marketing of sustainable mobility)*	89, 90, 91, 92, 93	5,300	4,400	K		
3.1 New construction of city properties (carbon footprint)	99, 100, 102, 103, 104, 107, 108	510	450	K		
3.3 Repair construction of city properties (ESCO)*	118	50	50	K		
3.3 Repair construction of city properties (smart district heating)*	119	420	120	I		
3.3 Repair construction of city properties (targets and database)*	120	50	50	K		
3.3 Repair construction of city properties (reporting)*	121	250	230	K		
3.4 Guidance of private repair construction (energy counselling) *	123	2,700	2,300	K	27.8	10
3.5 Timber construction (increasing timber construction)	128	5,300	1,100	I		
3.6 Infrastructure construction (transportation of soil)*	134	-6,200	-5,200	K		
3.7 Use of recycled materials (recycled materials for infrastructure construction)*	139	-630	-530	K		
4.1 Centralised renewable energy (district cooling)	150	1,100	150	I		
4.2 Smart energy networks and services (LED lighting)	154	6,100	1,900	I	0.1	-2400
4.2 Smart energy networks and services (LED lighting)	154	-7,800	-6,300	K		
4.3 Decentralised renewable energy (solar panels)*	156	510	70	I	0.02	-1,000
4.3 Decentralised renewable energy (solar panels)*	156	-260	-210	K		
4.4 Abandoning oil heating (city properties)	159	1500	470	I	0.6	-170
4.4 Abandoning oil heating (city properties)	159	-1,600	-1,300	K		
Costs during the programming period (EUR 1,000)		**156,000–165,000**	**71,000–78,000**			
Annual costs (EUR 1,000 per year)		**15,600–16,500**	**7,100–7,800**			
Additional cost of the roadmap during the programming period (EUR 1,000)		**88,000–91,000**	**34,000–37,000**			
Additional cost of the roadmap on an annual basis (EUR 1,000 per year)		**8,800–9,100**	**3,400–3,700**			

Figure 71: *Estimated cost of roadmap measures in the city proper. In addition, the additional cost of roadmap measures which have not yet been foreseen in the financial plan and which do not come directly from legislation, but which should be taken in order to achieve the carbon-neutrality goal, has been roughly estimated. For example, in terms of vehicle fuel source change, the additional cost of the more ambitious Sustainable Tampere 2030 target over and above the requirements of the EU Clean Vehicles Directive has been identified as additional costs. Additional costs are noted in the list of measures with an asterisk (*).*

Costs of the roadmap for city companies

Measure package	Measure	Total cost during the programming period (EUR 1,000)	Net present value in the programming period (EUR 1,000)	Investment (I)/ Operating expenses (K)	Emission reduction 2030 ($ktCO_2$)	Cost of emission reduction (EUR per tCO_2)
2.1 Tram transport (construction of the Hatanpää branch)	32	9,600	2,400	I		
2.1 Tram transport (construction of the second section)	34	84,800	16,500	I		
2.1 Tram transport (green electricity)	39	70	60	K		
4.1 Centralised renewable energy (Naistenlahti)	145	130,000	30,000	I	82	40
4.2 Smart energy networks and services (district heating battery)	152	6,000	1,700	I		
5.1 Waste management (separate collection: plastic, metal, glass and cardboard waste)	160	12,000	10,000	K		
5.1 Waste management (separate collection: organic waste)	161	13,000	10,000	K		
5.2 Circular economy (Sulkavuori)	175	242,000	39,000	I		
Costs during the programming period (EUR 1,000)		**497,000**	**110,000**			
Annual costs (EUR 1,000 per year)		**49,700**	**11,000**			

Figure 72: *Estimated costs of roadmap measures for the subsidiaries of the city group.*

Assessment of the most significant cost impact of the roadmap

The focus of the cost analysis in the roadmap is on the direct investment or operating expenses of the measures affecting the economy of the city proper and the known cost savings. The roadmap does not comment on the financing of the measures, but it is important to note that, for example, government support is significant for some measures. In addition, in the case of the operation of tram and bus lines for example, only operation costs without ticket revenue have been taken into account. The estimates therefore do not cover all costs or savings, so their sum does not form a "price tag" for the roadmap.

For some measures it has also been possible to calculate the cost of the emission reduction, or the cost-effectiveness of the measure.

The roadmap presents several major projects of the city-owned companies, such as the tramway, the conversion of the Naistenlahti Power Plant and the central treatment plant. Major projects of this kind are largely carried out for reasons other than climate and would in any case be carried out. For example, Tampereen Sähkölaitos must invest in a new power plant at the end of the lifespan of the old Naistenlahti plant, and Tampereen Sähkölaitos has considered it profitable to invest in renewable energy production in the new power plant at the same time.

In the case of city-owned companies, the measures must be economically profitable, based on business development or required by legislation. Increasingly, climate investment proves to be a good solution for business and a competitive advantage, which has led to the mainstreaming of climate-friendly activities. The investments by the city's companies are separated in the roadmap from the investments of the City of Tampere organisation.

Taking into account the above considerations, it can be roughly estimated that for the measures examined, the direct costs affecting the economy of the City of Tampere organisation, excluding its companies, will be in the range of EUR 156 million to EUR 165 million in the programming period 2021 to 2030. This amounts to approximately EUR 16 million annually. Taking into account the life cycle and time horizon of the investments, the net present value of the measures over the programming period is between EUR 71 million and EUR 78 million. This represents an annual cost of less than EUR 8 million. However, a large part of this amount is already expenditure under the current budgetary framework.

A distinction between actions which are not yet included in the financial plan and which are not required by the current legislation will result in an additional cost for the roadmap compared to current development. It is estimated at between EUR 88 million and EUR 91 million over the next ten years, or around EUR 9 million annually. The net present value of these activities is approximately EUR 34 million to EUR 37 million, or less than EUR 4 million annually.

It is also important to present the net present value of the measures in order to better assess their profitability and to take into account the time horizon. Cash flows at net present value have been converted to present value by discounting. This way, the cash flows of the different years are commensurate. The discount rate considered is 4%, which can be regarded as a reasonable value for public sector projects. In addition, the net present value has been evaluated for the programming period, i.e. in case of investment costs spanning beyond 2030 only the part applicable to the programming period has been included in the calculations. The calculation method is consistent with, for example, a study on Finland's cost-effective emission reduction path (Granskog et al. 2018).

Increased investment in sustainable mobility and construction

On the basis of the cost analysis, the most significant additional investments should be made, in particular, in promoting sustainable modes of transport, switching to cleaner fuel sources and repair construction.

Improving the public transport service level requires additional resources, in particular for frequencies of service on trunk lines and improving customer experience, such as customer communication (total cost of the public transport service level in the programming period is approximately EUR 26 million).

As regards walking and cycling infrastructure, investments are needed, in particular in pedestrian-oriented centres, additional space for pedestrian and bicycle traffic and their separation on their own routes, as well as in the development of regional main routes for cycling (total cost of walking and cycling promotion for the programming period is around EUR 61 million).

The development of tram transport is already well advanced and is estimated to be a cost-effective project. In addition to government support, it is estimated that the city's financial contribution will be returned with doubling ticket revenues, land value increases, land use efficiency and tax revenues (Grönlund et al. 2016).

The development of local-train transport also plays an important role in mobility as a whole. Government support for the above-mentioned transport projects is possible under the MAL4 agreement.

In addition to the service level and infrastructure, the marketing of sustainable modes of transport, i.e. mobility management, requires significant additional resources (total cost of the programming period is about EUR 5 million). In particular, the impact of the COVID-19 pandemic on the demand for public transport and the start of tram transport create an even greater need to encourage local residents to choose sustainable modes of transport. Investment in them has also often been found to be economically profitable.

According to a recent study, a change in the modal split in line with the carbon-neutrality goal of the City of Tampere, where the share of walking and cycling increases and the share of motoring decreases, could generate for Tampere a net benefit of approximately EUR 31 million during the programming period. Including the wider societal and individual impacts in the analysis, the net benefits are multiplied manifold (Joronen 2020).

Cleaner bus fuel sources can, at best, lead to significant cost savings due to lower operating costs for electric buses (the total costs for the programming period range from an optimistic estimate of cost savings of slightly under EUR 5 million to a pessimistic estimate of additional costs of more than EUR 4 million). The cost estimate for a change in fuel sources involves considerable uncertainty, which must be taken into account when interpreting the results. Government support for electric buses is possible under the MAL4 agreement.

As regards the city's cars and vans, it is estimated that their electrification is an economically profitable measure. With regard to parking tariffs and road charges, it would be possible to generate additional income for the city, but their impact needs to be further investigated and decisions made.

The main costs considered for sustainable construction relate to energy renovations and increased decentralised energy production. In the case of city properties, the statutory requirements are already high and energy class A is the target. In addition, the city also boldly promotes timber construction. The costs of these have been taken into account in the financial plans. Costs for construction have been estimated only for the life-cycle assessment of new buildings and other smaller measures, such as an increase in KETS funding to promote the energy efficiency agreement for municipalities, an increase in solar panels and abandoning oil heating.

Resource-smart construction solutions and the use of solar energy, for example, can lead to cost savings. Energy counselling for private buildings can have an impact on energy consumption with significant emission reduction potential. Increasing energy counselling could reduce emissions very cheaply. (The additional cost of the above-mentioned measures is between EUR 3 million and EUR 4 million for the programming period).

Many emission reduction measures are financially viable

In the economic analysis, the cost of emission reductions has been determined for those measures where there is a pressing need to assess and decide on alternatives. The calculations show that a number of emission reduction measures are economically profitable and that even cost savings can be achieved by reducing emissions. According to the calculations, the transition to clean fuel sources, energy-efficient solutions and renewable energy are economically profitable measures, taking into account their total costs and the life-cycle of investments.

APPENDICES AND REFERENCES

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Front and back cover:

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Roadmap layout:

Markkinointiviestintä Atomi Oy

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“Tampere will be carbon neutral in 2030. This objective will be achieved in cooperation with the city’s subsidiaries, stakeholders, businesses and residents. The objective of carbon neutrality will be taken into account in all of the city’s operations, procurement and investments. As a city of sustainable growth, Tampere values nature, conserves natural resources and reduces emissions.”

Tampere Strategy 2030

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