Environmental Report

2022

Helsinki

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Helsinki

City of Helsinki
Environmental Report
2022

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Address by the Deputy Mayor

The Helsinki City Strategy features ambitious environmental objectives. It sets ambitious policies for both reducing emissions and ensuring biodiversity, requiring us to pay more attention to reconciling housing construction and natural values.

Helsinki's emissions development shows that we still have work to do if we aim to achieve carbon neutrality by 2030. We are in a hurry; this July was the hottest month ever measured on the planet. Extreme weather phenomena can already be seen in Europe in the form of heat waves, blazing forest fires and floods. The heaviest torrential rains of the summer showed us that we have to prepare for extreme weather phenomena in Helsinki as well.

In 2022, Helsinki's overall emissions increased due to district heating emissions. This shows us that the changes needed in energy production are large in scale, even though here the reasons for the emissions development were external and related to the war in Ukraine. Next year's report will show an opposite development, as the Hanasaari coal power plant was shut down this spring. This will cause the city's total emissions to decrease by roughly 20 per cent. We must bring about a major change in district heating within this decade.

Going forward, we will update our emissions reduction measures on an annual basis, enabling us to react quickly to technological developments, energy prices and changes in the global situation alike. Traffic emissions are not being reduced fast enough in Helsinki. We need to make more decisions in order to expedite their reduction. We must also find a way to finally increase the proportion of public transport in Helsinki residents' transport choices above the pre-COVID-19 pandemic level.

Comprehensive work to promote biodiversity is bearing fruit. Nature values were taken into consideration in our significant zoning plans. Helsinki is preparing four new component master plans, in each of which nature values are in a key role from the start. In detailed planning, biodiversity can be seen not only in taking nature areas into account and preserving them, but also in issuing various plan regulations intended to make the city greener. The Urban Environment Committee approved a total of 51 reviewed detailed plan proposals, 46 of which had no conflicts with the ecological network.

Four new nature reserves were founded. With these decisions, four per cent of Helsinki's land area is now protected. The City is also currently carrying out important work to update its forest management principles. The new City Strategy states that securing biodiversity is the most important objective in forest management.

On a delightfully positive note, the load on the Vantaa River has decreased as the result of persistent work.

Thank you to everyone who took part in the environmental work and reporting!

Anni Sinnemäki
Deputy Mayor for Urban Environment

Helsinki in a Nutshell

Helsinki is the centre of a rapidly growing large metropolitan city area. Helsinki, together with the municipalities of the Helsinki Metropolitan Area (Espoo, Vantaa, and Kauniainen) and ten neighbouring municipalities, forms an area with a population of over 1.5 million residents, which is referred to as the Helsinki region. As of 31 December 2022, Helsinki had a population of 664,028. As of the end of 2022 the population density was 3,096.9 residents per land area square kilometre. There were a total of 471,400 jobs in Helsinki in 2022. Helsinki accounts for 18 per cent of Finland's jobs. The city of Helsinki's surface area is 715.48 km^2, of which 214.19 km^2 (29.9 %) is land, 0.89 km^2 is inland waters, and 500.4 km^2 sea waters.

From an environmental impact's perspective, the City of Helsinki is one of the most significant actors at the Finnish scale. Helsinki is, for example, the largest public procurer in Finland, and the annual volume of the City's procurements is about four billion euros. Helsinki's total greenhouse gas emissions are approximately five percent of Finland's total greenhouse gas emissions. The Viikinmäki wastewater treatment plant cleans the wastewater produced by approximately 900,000 people. Additionally, as Finland's largest employer, the City's operations also have significant environmental impacts.

The Helsinki City Group comprises the following entities:

- The City of Helsinki as a parent entity (4 divisions, City Executive Office, Audit Department and 5 municipal enterprises).
- Subsidiary entities, i.e. organisations which are owned directly by the City (88 subsidiary organisations and 13 foundations).
- Associated entities, i.e. companies, foundations and joint municipal authorities in which the City has a 20–50 per cent ownership stake (1 holding company, 35 associated companies and 6 joint municipal authorities).

At the end of 2022, the City employed 37,513 people.

Helsinki

Population: 664,028

Population density: 3,096.9 / km^2

Surface area: 715.48 km^2

Jobs: 471,400, 18 % of Finland's jobs

Environmental management and partnerships

The objective of the Helsinki City Strategy (2021–2025) is to achieve sustainable growth in harmony with ecological boundary conditions. The City Strategy sets 13 areas of emphasis, one of which is 'Ambitious climate objectives and nature conservation'. The goal is to achieve a carbon-neutral Helsinki that sets an example and does more than its fair share in preventing climate change. Climate change is progressing and requires adapting to its impacts as well. Helsinki is preparing for extreme weather phenomena and their indirect impacts. Helsinki is committed to promoting circular economy and reducing lifecycle emissions. The city's growth requires coordinating densification with local nature values. Helsinki is actively protecting its diverse nature and does not carry out construction in its most valuable nature areas. Helsinki cherishes the Baltic Sea and its shores and is decreasing emissions into the sea.

Helsinki is committed in its City Strategy to promoting the global Sustainable Development Goals under the 2030 Agenda. In 2022, the City launched its third city-level sustainable development reporting round. The report was completed in the spring of 2023 and submitted to the UN.

The City's environmental policy complements the current City Strategy in terms of environmental protection. By monitoring the environmental policy indicators set out in the Environmental Report, we are also partially monitoring the implementation of the City Strategy. In addition to the Environmental Report, Helsinki Environmental Statistics also offer multifaceted information about the City's environmental status. The information in the Environmental Report and statistics is open data.

Environmental management systems supporting operational development

The objective is for environmental management to be a cross-cutting part of all of the City's management operations. The objective set in the City's environmental policy is for the City's divisions, enterprises and subsidiaries to develop their environmental management by introducing environmental management systems or adhering to the principles thereof. The Helsinki Group uses the EcoCompass, Green Office and ISO14001 environmental management systems, as well as the Eco-Schools programme and the OKKA certificate for sustainable development for educational institutions and daycare centres.

In 2022, the EcoCompass environmental management system certificate was granted for the first time to the Helsinki City Museum and Helsinki Art Museum, Sports Services and the Social Services and Health Care Division (current Social Services, Health Care and Rescue Services Division). Of the City's subsidiaries, the EcoCompass certificate was granted to Kiinteistö Oy Kaapelitalo for the first time.

The staff's environmental know-how was increased

The Urban Environment Division continued its collaboration with Helsinki Vocational College and Adult Institute to develop the environmental know-how of the City's supervisors. In 2022, environmental matters were discussed at a one-day training course on strategy and the changing operating environment. Environmental management is also covered by the City Executive Office's Startti esihenkilötyöhön ('Starting in a Supervisory Position') online training course, which was completed by 62 supervisors. Also an online training course on sustainable development for the entire staff was completed in 2022.

By the end of 2022, the number of eco-supporters working in the Helsinki Group was 1,389. Five eco-support training courses were held in 2022, with a total of 53 new eco-supporters participating. In addition to basic-level training, the eco-supporters were provided with meetings and further training on changing themes. Financial support for eco-support activities was granted to 17 work communities to promote aspects such as sustainable consumption, environmental education

and local biodiversity. In 2022, there were a total of 34 municipalities, joint municipal authorities and other organisations operating in the national eco-support activity network coordinated by the City of Helsinki.

The sustainability of tourism and events was promoted

Helsinki took 12th place in the Global Destination Sustainability (GDS) index, which measures the sustainability of travel destinations. This was a four-place improvement from 2021. The index measures the sustainability of travel destinations in four different categories with 70 indicators. The Helsinki City Strategy aims at developing Helsinki into the world's most sustainable and smartest tourism destination. Furthermore, the Helsinki Tourism and Event Operating Plan aims at placing Helsinki at the global forefront in sustainability, as verified by indexes and certifications. Correspondingly, the City is aiming at further improving its ranking in the GDS index in the future.

The objectives of the Sustainable Growth for Tourism project coordinated by Helsinki include, among other things, promoting the sustainability of tourism and event sector businesses and reducing their carbon footprint. Helsinki is also involved in the Carbon Neutral Experience project, the objective of which is to promote carbon-neutral tourism in the Uusimaa region. Among other things, the project involves carrying out destination-level tourism carbon footprint calculations for the municipalities taking part. Furthermore, Helsinki has signed the Glasgow Declaration on Climate Action in Tourism of the UN.

The Urban Environment Division grants a 30 per cent discount on the rent charged for the use of its areas against an audited EcoCompass environmental management system in order to encourage events to use the system. In 2022, the City granted the discount to the Flow Festival, Naisten Kymppi – Women's Fun Run, Great Beers – Small Breweries and Helsinki City Running Day events.

Eyes on the future

Environmental policy update work to complement the City Strategy in terms of environmental protection is in progress and will continue in 2023. Developing the know-how of supervisors has been identified as a key factor in promoting the City organisation's environmental management, and the City is planning to continue and expand its environmental management training courses for supervisors in the coming years. The City's project to develop environmental statistics is currently running and will continue throughout 2023.

The environmental management model of the City of Helsinki

The City Council has approved the City Strategy for 2021–2025, which is a document that steers the City's operations. In 2012, the City Council also approved the City's environmental policy, which supplements the current City Strategy with regard to environmental protection. The environmental policy sets out the City's environmental protection objectives for the medium term (2020) and the long term (2050). The objectives of the City's environmental policy are pursued with the programmes of various environmental protection sectors, which include (the body deciding on the programme in parentheses):

- Carbon Neutral Helsinki Action Plan (City Board)
- Climate change adaptation policies for 2019–2025 (City Board)
- Noise Abatement Action Plan 2018–2022 (Environment and Permits Sub-committee)
- Air Quality Plan 2017–2024 (Environment and Permits Sub-committee)
- Baltic Sea Action Plan 2019–2023 (City Board)
- Helsinki's Nature Conservation Programme 2015–2024 (Environment Committee)
- City of Helsinki Biodiversity Action Plan 2021–2028 (Urban Environment Committee)
- Roadmap for Circular and Sharing Economy (Urban Environment Committee)
- Littering Mitigation Action Plan 2022–2025 (City Board)

The City has made an Energy Efficiency Agreement of the municipal sector 2017–2025 with the state, as well as an Action Plan Of Rental Housing Communities In The Housing Property Sector 2017–2025 related to an Energy Efficiency Agreement of the Property and Building Sector, which sets an energy savings objective for the agreement period. Progress towards this objective is reported on annually.

The City Board approves the instructions for drafting and following the budget, which include instructions on recording and taking environmental matters into account.

The City's divisions, enterprises and subsidiaries implement the City Strategy, as well as the programmes of various environmental protection sectors, in their operations. Several divisions, enterprises and subsidiaries have also introduced environmental management systems and sustainable development programmes. Below is a list of the systems in use:

- ISO 14001 environmental management system: Metropolitan Area Transport Ltd, Finlandia Hall Ltd, Helen Ltd, Port of Helsinki Ltd
- Certified EcoCompass environmental management system: Urban Environment Division, Social Services and Health Care Division (current Social Services, Health Care and Rescue Services Division), Pakila Work Centre, Kinapori Senior Centre, Youth Services, Sports Services , Helsinki City Library network, Helsinki Art Museum and Helsinki City Museum, Helsinki Biennial, Stara, Palvelukeskus Helsinki, Helsingin Asumisoikeus Oy, Helsingin Seniorisäätiö, Helsinki City Theatre, Jääkenttäsäätiö, Oulunkylä Rehabilitation Centre, MetropoliLab Oy, Helsinki City Housing Company Ltd, Korkeasaaren eläintarhan säätiö sr (Korkeasaari Zoo), Urheiluhallit Oy, Helsinki Metropolitan Area Reuse Centre, Niemikoti Foundation, Stadium Foundation, Kiinteistö Oy Auroranlinna, Helsinki Events Foundation, Kiinteistö Oy Kaapelitalo
- EcoCompass environmental management system being built: City Executive Office, Helsinki Vocational College and Adult Institute's Villa Ullas, Rescue Department (integrated into the EcoCompass for the new Social Services, Health Care and Rescue Services Division as of 2023), Helsinki City Premises Ltd
- Green Office environmental management system: Education Division administration, Helsinki Metropolitan Area Reuse Centre, Forum Virium Helsinki, Port of Helsinki Ltd
- Green Office system being built: Helsinki Partners Oy
- Eco-Schools certificate or OKKA certificate for sustainable development for educational institutions: 37 City schools, daycare centres and upper secondary schools

There are eco-supporters working in the City's divisions, enterprises and subsidiaries who promote environmentally sustainable operating methods and increase environmental awareness on top of their own work.

The divisions and enterprises have the opportunity to set binding environmental objectives in the budget. In 2022, objectives were set by the Urban Environment Division, Helsinki City Transport (HKL) and City of Helsinki construction services Stara.

The City's environmental work is reported on annually in its annual Environmental Report, which also monitors environmental policy indicators. The Environmental Report is reviewed by the City Board and the City Council.

Mitigating climate change

The City of Helsinki aims to become carbon-neutral by 2030. This means that direct emissions (Scope 1 and 2) must be reduced by at least 80 per cent from the 1990 level, whereby the remaining emissions can be compensated for. An update to the Carbon Neutral Helsinki Action Plan was approved by the City Board in August 2022. The City has been paying special attention to the effectiveness and additionality of its measures and is aiming to achieve emissions reductions in accordance with the City Strategy, particularly in the areas of heating, traffic and construction. The City Strategy sets a zero-carbon objective for 2040, followed by carbon negativity. In the spring of 2022, the City established four cross-administrative strategic master programmes presided over by the Mayor, one of which is Ambitious Climate Responsibility. The group decides on guidelines for climate work and ensures a sufficient level of ambition in mitigation and adaptation work alike.

Total greenhouse gas emissions increased from the previous year

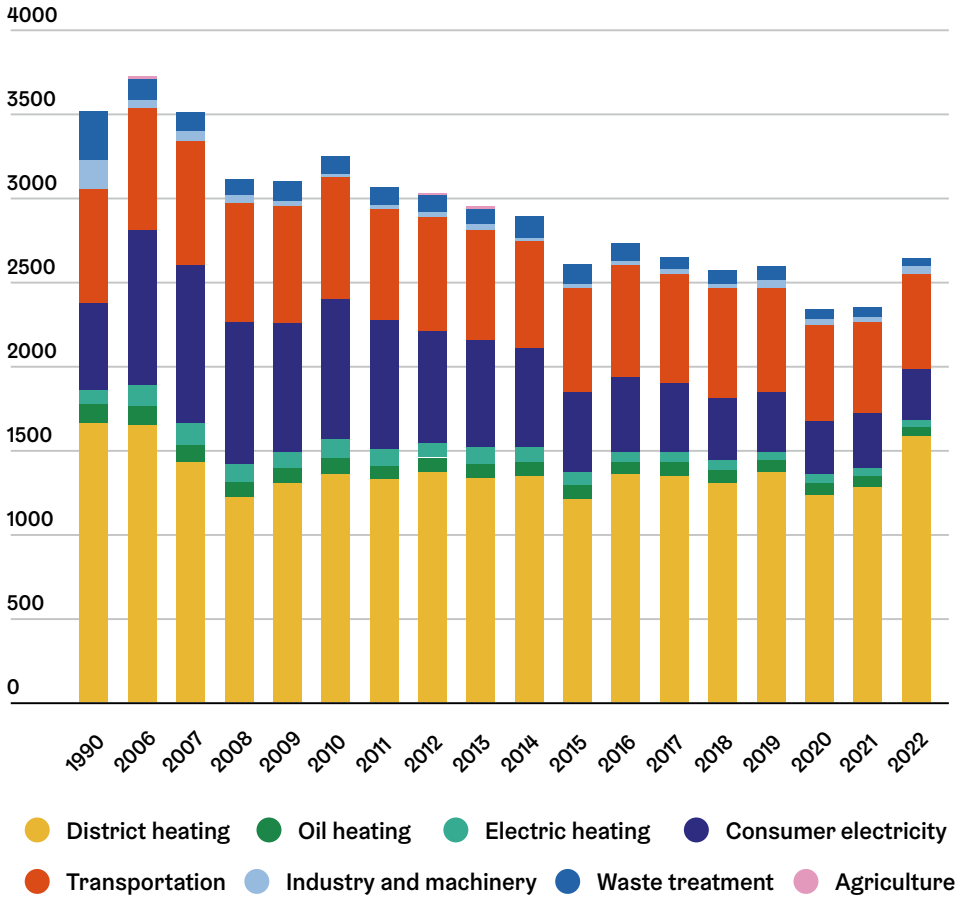
According to the data of the Copernicus Climate Change Service (C3S) of the EU, 2022 was the fifth hottest year ever measured. The eight hottest years on record were from 2014 to 2022. 2016 was the all-time hottest year on record. The average temperature of the world has increased by 1.2 °C from the pre-industrial era. Temperature records were broken across Europe in 2022, and the year was the second hottest on record in Europe.

In 2022, greenhouse gas emissions from Helsinki's residents, services and industry amounted to 2,637 kt CO_2e, increasing by 12 per cent from the previous year. The increase in overall emissions is due to emissions from district heating increasing significantly (by 23 per cent) despite emissions from other sectors decreasing. The increase in emissions from district heating is explained for the most part by Helen Ltd's fuel distribution; the company had to substitute natural gas in its district heating production with coal and oil. The amount of district heating produced with heat pumps decreased as well, partly due to high electricity prices. Electricity consumption decreased by three per cent, particularly due to high electricity prices and energy conservation campaigns. A decrease in the emission factor of electricity also contributed to the level of electricity-based emissions. Greenhouse gas emissions from traffic increased by four per cent. This was due to increased emissions from lorry and bus traffic. Another factor contributing to the increase in emissions was that the distribution obligation for 2022 was decreased by 7.5 percentage points. However, the overall mileage of traffic remained almost unchanged. Compared to 1990, the total emissions of Helsinki were roughly 25 per cent lower. Emissions per capita were 4.0 t CO_2e, i.e. they increased by 11 per cent from the previous year and were 44 per cent lower than in 1990.

Renewable energy accounted for 21% of the energy produced by Helen in 2022. All in all, 37 per cent of the energy produced was carbon-neutral.

Total greenhouse gas emissions in Helsinki

Total emissions in Helsinki (1,000 t CO_2e)



The many roles of climate change mitigation

Climate change has different manifestations and impacts in different sections of the City organisation. The City's divisions and enterprises play different roles in climate change mitigation. The City is encouraging its staff to carry out their work remotely where possible and supports the use of public transport by means of work commute vouchers and business travel tickets, as well as city bike and bicycle benefits. Digitalisation and electronic services make it possible for clients to access and receive the City's services without needing transport, and electronic communication reduces transport needs among employees.

As a technical operator, the Urban Environment Division is responsible for the majority of the measures of the Carbon Neutral Helsinki Action Plan. Going forward, the measures will be updated annually, enabling the City to react faster to aspects such as technological developments, energy prices and changes in the global situation. The Urban Environment Division also administrates the majority of properties used by the City, taking care of measures related to energy efficiency, among other things, on

behalf of other divisions and enterprises. Furthermore, the Urban Environment Division's City Planning Department is responsible for establishing guidelines for developing the urban structure and traffic, which have a significant effect on the development of emissions. Functions related to construction and worksite activities also play a key role, and more information about them is provided in the 'Construction' chapter of this report.

The Education Division is tasked first and foremost with serving as a climate educator and providing Helsinki residents of different ages with information and skills that enable them to consider climate change mitigation in their own activities. The Division has developed a sustainable development study path that involves delving into climate change in early childhood education, basic education, upper secondary education and non-formal education. More information about the study path is provided in the 'Environmental awareness and education' chapter of this report.

The Culture and Leisure Division is responsible for the City's libraries, cultural institutions, physical activity sites and youth activities. Several energy efficiency measures have been carried out in the Division's offices. More information about the City's energy efficiency work is provided in the 'Energy' chapter of this report. Cycling and walking opportunities have been improved and charging stations for electric cars have been built in the customer parking areas of physical activity sites. For its part, the City Museum is aiming at sustainable use of the built cultural environment through the steering of planning and construction projects and statement work. In youth work, the climate theme is an integral part of operations.

The role of the Social Services and Health Care Division (current Social Services, Health Care and Rescue Services Division) is highlighted in climate change adaptation work, which is described in greater detail in the 'Climate change adaptation' and 'Environmental risks' chapters of this report. Key aspects of mitigation work include improving the energy efficiency of properties and electrifying equipment. The Rescue Department is in the process of switching to electric equipment, and charging stations for electric cars have been built on properties.

The new Helsinki Tourism and Events Programme for 2022–2026, coordinated by the City Executive Office, features climate-related measures. In 2022, the City developed an event carbon footprint calculator suitable for events of different sizes and types ranging from open air events to congresses, as well as hybrid and virtual events.The purpose of the calculator is to help event organisers identify the key emission sources of events. The carbon footprint calculator was published in the spring of 2023.

Service centre Palvelukeskus Helsinki's role in climate change mitigation is connected in particular to the climate impacts of food and procurements. The objective is to halve the food waste generated in food services by 2030. The service centre is constantly developing environmentally friendly recipes. A Responsible Menu Development Working Group has been established in collaboration with the Education Division and the Social Services and Health Care Division (current Social Services, Health Care and Rescue Services Division) for the purpose of planning and monitoring menu changes. In accordance with the Clean Vehicles Directive, Palvelukeskus Helsinki is switching to electric cars in its vehicle stock and striving to reduce the climate emissions of food transport operations by setting appropriate criteria in its procurements. The climate criteria for procurements will be made stricter in terms of other procurements as well.

Carbon Neutral Helsinki

The implementation of the Carbon Neutral Helsinki Action Plan is progressing as shown in the table below. The measures involved are discussed in greater detail in the 'Energy', 'Construction' and 'Traffic' chapters of this report.

Status of the actions included in Carbon Neutral Helsinki Action Plan on 31 March 2023

Action	Sector	Progress
Category 1: Actions that reduce emissions		
Adjusting the ventilation in City facilities to an appropriate level.	Heating	Progressing moderately well
Low-emission concrete in infrastructure projects.	Construction (Scope 3)	Progressing moderately well
Reducing the emissions from the preconstruction at the former Malmi Airport area by 50%.	Construction (Scope 3)	Well underway
Lowering temperatures in City-controlled facilities.	Heating	Well underway
Replacing outdoor lights with LED lights.	Electricity	Progressing moderately well
Planning and implementing City facilities and service buildings so that the E value will be -30% of the national threshold value for the use class.	Heating	Well underway
Renovation projects of City facilities and service buildings will be implemented so that the E value will decrease by 34% of the buildings' original E value.	Heating	Well underway
Requiring energy class A of residential blocks of flats (use class 2) in the property conveyance conditions.	Heating	Well underway
Requiring energy class A of residential blocks of flats (use class 2) in detailed planning.	Heating	Well underway
In detailed planning, buildings other than residential ones will be required to be of a class that is -20% of the national norm set for that type of building.	Heating	Well underway
The main heating system selected for the City's facilities and service buildings will be a heat pump system if its repayment period is under 15 years and its implementation is technically feasible.	Heating	Progressing moderately well
Exchanging City-owned passenger cars for electric cars in 2021–2025.	Transport	Not on schedule

Action	Sector	Progress
Category 2: Required actions that facilitate emissions reduction		
Principles for low-temperature regional heating entities.	Heating	Well underway
Reprogramming the implementation plan of the Baana cycling network and the target network up to 2030.	Transport	Progressing moderately well
"Constructing charging stations for electric cars in line with the forecast on the number of electric cars.	Transport	Well underway
Establishing tendering processes for the energy solutions for City-owned facilities.	Heating, Electricity	Well underway
Launching Energy Renaissance guidance services.	Heating	Well underway
Allowing the construction of geothermal heating systems in public areas.	Heating	Well underway
The plot conveyance conditions will require that new sites' parking spaces be implemented so that they are electrified and one third of the spaces are equipped with a charging station.	Transport	Well underway
Implementing the Bicycle Action Plan.	Transport	Progressing moderately well
Category 3: Surveys to determine new emissions reduction actions		
Review on steering construction through carbon footprint.	Heating, construction (Scope 3)	Well underway
Accelerating the energy efficiency improvements on City-owned properties outside renovation projects (Definition of the implementation process for energy surveys).	Heating, electricity	Progressing moderately well
"Review of emissions reduction methods for transport.	Transport	Well underway
Promoting the definition of effective regional emissions reduction measures on mobility.	Transport	Progressing moderately well

Helsinki City Contruction Services Stara has carried out energy efficiency measures on its properties, overhauling their building services. Stara procures green electricity and is involved in the implementation of the Green Deal for low-emission worksites. The objective is to increase the use of renewable diesel. Stara is also responsible for all procurements related to the City's machinery. In terms of equipment procurements, the objective is to replace all of the City's cars with electric ones by 2025.

Having begun in 2016, the European mySMARTLife project ended in September 2022. Included in the EU's Horizon 2020 programme, the project involved developing various smart pilots with the aim of achieving emissions reductions, particularly in the areas of housing, traffic and energy.

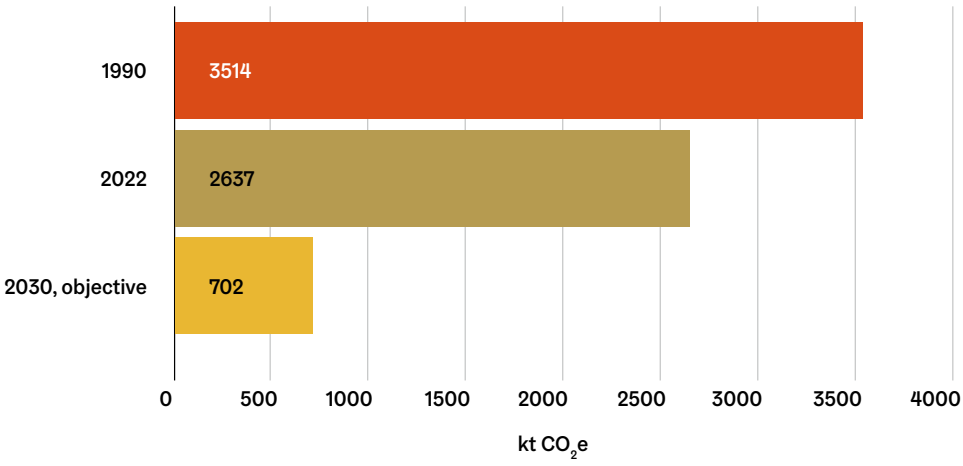
Mitigating climate change in the City's subsidiaries

The City's subsidiaries are steered through ownership strategies, and the creation of a carbon neutrality plan is included in the strategies of a majority of them. By the end of 2022, 39 subsidiaries had created a carbon neutrality plan. The subsidiaries have carried out plenty of climate change mitigation measures, such as commissioning electric and gas-powered equipment, implementing energy conservation measures, switching to renewable electricity and taking the climate perspective into account in procurements. More information about the energy efficiency work of the City's subsidiaries is provided in the 'Energy' chapter of this report.

Helen Ltd aiming to become carbon-neutral

Helen Ltd aims to become carbon-neutral by 2030. The company published a carbon neutrality programme and was the first Finnish energy company to have its emissions reduction objective approved by the Science Based Targets initiative (SBTi). SBTi is an international initiative, the purpose of which is to promote climate measures by helping companies set science-based and sufficiently ambitious

Emissions situation in Helsinki



objectives for their operations. The objectives set by Helen Ltd are based on the Paris climate change agreement, the objective of which is to limit global warming to 1.5 °C. The company is also preparing for the Corporate Sustainability Reporting Directive (CSRD) to enter into force in the beginning of 2024, requiring companies to be able to show that their operations are in line with the objectives of the Paris climate change agreement. The company is also investing in digital services that support customers in their energy conservation efforts.

As part of its carbon neutrality objective, Helen Ltd will build more than 2,000 megawatts' worth of capacity to replace fossil energy production in the coming years. The 20 wind power plants of the Lakiakangas 3 wind farm began regular electricity production in April, while the seven plants of the Juurakko wind farm began their operations in November. Helen Ltd is also investing in the Kalistanneva, Karahka and Niinimäki wind farms. The amount of wind-powered electricity was also increased by Suomen Hyötytuuli's investments in the Oosinselkä and Siikajoki wind farms. The company began building an industrial-class solar park in Nurmijärvi and purchased a construction-ready 206-megawatt solar park from Uusikaupunki. The company's plans also include a ten-megawatt park in Lohja. A bio-heating plant in Vuosaari began heating production in December.

Eyes on the future

The implementation of the Carbon Neutral Helsinki Action Plan continues, and new measures are added to the programme every year. The significance of traffic in terms of emissions will increase as heating costs decrease faster due to the abandonment of coal power. The burning of coal was ceased at the Hanasaari power plant in the spring of 2023. At the Salmisaari plant, the burning of coal will cease in the spring of 2025. Reducing traffic emissions requires several procedures. Other forms of climate change mitigation work are also continuing within the City organisation and its subsidiaries.

Adapting to climate change

Adapting to climate change, or climate change adaptation, refers to the means of preparing for extreme weather phenomena, adapting to long-term global warming and reducing the detrimental effects of and vulnerabilities caused by climate change. According to the City Strategy, "we will all have to adapt to the consequences of our planet's climate crisis. The health, property and way of life of Helsinki's inhabitants must be protected. The goal is to prepare Helsinki well for extreme weather phenomena and their indirect effects."

Helsinki has assessed the weather and climate risks pertaining to the city. The city's key climate risks are stormwater floods caused by torrential rains, a sudden rise in the sea level caused by storms, slipperiness, extreme and abnormal winter conditions, heat waves, drought and the eutrophication of the Baltic Sea.

Climate change adaptation policies – a key programme in the management of climate risks

Helsinki's climate change adaptation policies 2019–2025 is a programme through which the City of Helsinki aims to adapt to climate change and prepare for extreme weather phenomena.
The vision of the policies is 'Climate-proof Helsinki in 2050'. The adaptation measures are included in the City's planning and guidance, e.g. in land use planning, preparation and preparedness planning, stormwater management, the strengthening of green areas and structures, and nature conservation and management.

Progress of Helsinki's climate change adaptation policies in 2022

A City-level expert group for adaptation, appointed by the Head of the City Executive Office, continued implementing its prioritised measures over the course of the year. The prioritised measures were: natural stormwater management and the reinforcement of green structures, climate-proof construction and renovation, and the management of climate risks and crisis situations as part of the City's management system.

Helsinki led a broad cooperative project with the municipalities and universities of the Helsinki metropolitan area to prepare a project entitled ARVO – Viherrakenteen arviointi ja vahvistaminen kaupunkien maankäytön suunnittelussa ('Assessment and Strengthening of Green Structures in Cities' Land Use Planning'). The project aims at reinforcing natural stormwater management and green structures, and the City applied for EU funding for it. The main objective of the project is to strengthen green structures in densely built cities in the Uusimaa region to promote preparing for and adapting to climate change.
To achieve this objective, the project involves developing a tool for regionally prioritising the identification, preservation and increase of sufficiently multi-function and diverse green structures in land use planning.

The HuLaKaS project on stormwater quality and inlet-specific filtering was also implemented over the course of the year.

The project involved determining qualitative risk areas for stormwater in Helsinki and creating instructions regarding the risk identification method for municipalities. The final seminar of the project was held in December 2022, and the work will continue in 2023 in the form of implementing measures to improve the quality of the risk sites.

Climate change brings about challenges to climate-proof construction. The overall picture keeps developing, and plenty has been done with regard to protecting structures against moisture and cooling buildings in particular. Social services and health care buildings have been prioritised in terms of protection against heat waves, and these sites are currently being worked on. However, the perspective of preparing for heat waves and stormwater floods should be extended from buildings to cover the entire plot, and in that context, increasing green structures such as trees and other vegetation is one of the key solutions.

The City has a model in place for crisis management. Action cards have been developed for climate risks caused by extreme weather phenomena, containing information such as contact persons and operating instructions in case of disruptions caused by extreme weather phenomena. Climate change is also included in the Helsinki Group's significant risks.

Eyes on the future

In order to improve the effectiveness and systemicity of its climate change adaptation work, the City is further prioritising its adaptation measures. The objective is to produce a comprehensive review of the City's climate adaptation measures, coordinated by the Climate Unit. Helsinki's boundary conditions and minimum level for adaptation will be determined in connection with the planning process. Based on climate risks, preparing for torrential rains was selected as the first priority in implementing the overall adaptation plan, while preparing a heat wave plan was set as the second priority. In order to promote seawater flood management, the City has assembled a flood group who will begin their work in 2023.

Securing biodiversity

The Helsinki City Strategy for 2021–2025 emphasises ambitious nature conservation, the objective of which is to maintain diverse nature in the city. The City is working towards this objective through implementing its Biodiversity Action Plan, protecting the most valuable areas in accordance with its current Nature Conservation Programme and preparing a new Nature Conservation Programme.

A growing city, local nature and biodiversity

Coordinating the securing of biodiversity, the preservation of the local nature and the growth of the city was promoted on several fronts. In land use, significant instruments for this include component master plans and detailed plans, as well as work related to ecological networks that supports these as a knowledge base.

In 2022, the City of Helsinki was preparing four new component master plans (Lahdenväylä, Länsiväylä, Vartiosaari and Östersundom). Nature values were in a key role in all four from the start of the preparation work. The City also had bird surveys and, with the exception of Lahdenväylä, bat surveys conducted in connection with preparing all the component master plans.

In detailed planning, biodiversity can be seen not only in taking nature areas into account and preserving them, but also in issuing various plan regulations intended to make the city greener. In 2022, the Urban Environment Committee approved a total of 51 reviewed detailed plan proposals, 46 of which had no conflicts with the ecological network. Projects involving minor conflicts were identified in a review of the geographical information of ecological networks. The impacts on the natural environment were assessed separately for each plan. Based on these assessments, the impacts on the natural environment were deemed to be local.

Seven of the proposals featured shore areas, and the current natural environment of their natural shores will be preserved. Green roof provisions were included in 25 of the reviewed plan proposals, and two reviewed plan proposals provided for the use of green walls. Diverse green roof structures are being piloted in the Broända area of Vuosaari.

The City's ecological network reviews were complemented with blue network work, which involved establishing the most ecologically valuable sites of Helsinki's water areas and defining quality targets for the blue network. The work will continue in 2023 with the identification of procedural needs.

Systematic monitoring of nature now in progress

The implementation of Helsinki's ten-year Nature Monitoring Plan began with monitoring projects scheduled for 2022, of which there were 18 in total. 16 of them were implemented partially or completely, but the monitoring of wear and compilation

of occurrence information regarding endangered species were not carried out. However, occurrences of endangered and otherwise notable vascular plants were demarcated in connection with updating the charting of valuable plant sites. With the piloting year of the monitoring projects, the resources needed for both collecting monitoring information and coordinating and reporting on the work are now well identified. The monitoring projects will continue as planned in 2023, and over time, they will yield a systematically documented nature information time series indicating the development of the state of biodiversity in Helsinki.

Nature investments

A significant achievement in 2022 was the demarcation of local ecologically significant water nature areas. The materials were produced in collaboration with the Finnish Environment Institute and Metsähallitus. In Helsinki, such areas can be found in locations such as Vanhankaupunginlahti, Laajalahti, the surroundings of the Kallahdenniemi esker and the outer archipelago.

Several changed calcareous rock areas are a special characteristic of Helsinki. They were quarried back in the day in areas such as Haltiavuori, Mustavuori and Vuosaari. The vegetation of the best lime rocks consists of highly species-rich lime rock meadows, the flora of which features plenty of endangered and rare species. In 2022, the City's most significant lime rock areas were inventoried in connection with the surveying of Helsinki's endangered nature types.

Nature management

Helsinki began updating its nature management principles in accordance with the principles of the new City Strategy and the Biodiversity Action Plan. Increasing biodiversity is set as the most important objective of these principles. The updating work was carried out in close collaboration with stakeholders, and comments regarding the draft of the principles were collected in the Kerro Kantasi feedback service in the autumn of 2022. The principles for forest management will be completed in 2023, after which the City will update its policies concerning the management of meadows and other open areas.

A toolbox was created for improving the quality of meadows and sections of the meadow network. The toolbox provides instructions and operating models for developing Helsinki's meadow network at different levels of city planning and implementation from zoning to project planning and implementation, as well as site maintenance. The work also involved drawing up project proposals for improving the quality and ecological connections of five meadow concentrations that are significant to the meadow network.

Cattle grazing was continued in the Bruksviken area of the Östersundom bird wetlands. Common reeds were mowed extensively in the Ruovikosta lentoon ('Taking Flight from the Reeds') Helmi project in order to improve the living conditions of the birds of the Östersundom bird wetlands. The City's Helmi projects aiming at restoring the Haltialanmetsä swamp groves and Bengtsår oak groves and semi-natural biotopes also made good progress. On Bengtsår, damage caused by white-tailed deer was combated by building game fences, semi-natural biotopes were restored by mowing and the living conditions of oak trees over the age of 200 were improved. In October 2022, a sheep pasture was completed on the island, enabling the sheep of the Haltiala Farm to take part in the management of semi-natural biotopes in the future. In Haltialanmetsä, dams were built in old drainage ditches to facilitate the revitalisation of the original swamp grove over time. Both on Bengtsår and in Haltialanmetsä, the local vegetation was inventoried in order to accumulate

monitoring information regarding the nature management measures.

A range of insect hotels was designed for the City of Helsinki to support pollinators. The three different insect hotels were designed particularly for public urban environments, such as parks, allotments and school yards. The blueprints and a manual for starting a hotel are freely available for use.

The fight against invasive species continued actively within the resources available. In particular, the City's three-year project to combat the rugosa rose involved actions to prevent the species in Mustikkamaa, Lauttasaari and the archipelago, particularly the Pitkäouri nature reserve. The project was funded by the Centre for Economic Development, Transport and the Environment. All in all, the preventative measures focused on twelve plant species and four animal species. Invasive species were also combated as volunteer work by Helsinki residents. The City continued holding invasive alien species prevention events open to all residents in collaboration with WWF Finland and Helsingin luonnonsuojeluyhdistys. Nine volunteer work days to combat the rugosa rose and eight days to combat the Himalayan balsam were organised across Helsinki. Helsinki was also involved in the Soolotalkoot campaign of the Finnish Association for Nature Conservation's Viekas LIFE project, in which people are encouraged to independently combat invasive species.

Nature protection

Four new nature reserves were established in Helsinki in 2022: The Centre for Economic Development, Transport and the Environment made a founding decision on the Kruunuvuorenlampi, Tahvonlahden harju, Rudträsk and Uutelan metsä areas. Founding applications and maintenance and usage plans were

Surface areas of the current nature reserves, other protected sites and areas proposed to be founded in 2022

	Area (ha)	Share of land area (%)	Share of water area (%)
Land area			
Nature reserves	857.8	4.0	
Other protected sites*	117.3	0.6	
2022 applications	73.4	0.3	
Total	1,048.5	4.9	
Water area			
Nature reserves	492.0		1.0
Other protected sites*	243.6		0.5
2022 applications	0		0
Total	735.6		1.5

* protected nature types, species protection areas and Natura areas not protected by the Nature Conservation Act

prepared for five new sites. These are the fine rocky sites of Hallainvuori and the Kivikko fortification, the meadows of Uussillanpuisto featuring valuable semi-natural biotopes, the Oulunkylä hardwood grove and the Veräjämäki forests. The Veräjämäki forests, valuable in particular for their range of polypore species, are not included in the City of Helsinki Nature Conservation Programme 2015–2024. Instead, they originally became protected due to a council initiative as Helsinki's gift to commemorate Finland's centennial.

The proportion of nature reserves in Helsinki's land area increased by 0.2 percentage points from 2021, from 3.8 per cent to 4.0 per cent. The total area of protected water areas did not change, as no new conservation areas were established on water bodies.

Strengthening nature knowledge

The City's nature service plan was actively worked on in 2022. Residents' wishes were charted with an online survey, and nature service information was compiled and updated to establish the current state of the City's nature services. The plan will be completed in 2023, and it will be used to direct and develop the recreational use of nature. The objective is to provide equal recreational use opportunities to all Helsinki residents while also preventing wear on nature from endangering biodiversity.

Contents for the LUMO-vahti monitoring tool of the Biodiversity Action Plan (lumovahti.hel.fi) were compiled throughout the year, and its website was published in January 2023.Anyone can use the website to monitor the progress of the City's programme. Each of the 95 measures has a dedicated page that displays the related plans and progress.

Eyes on the future

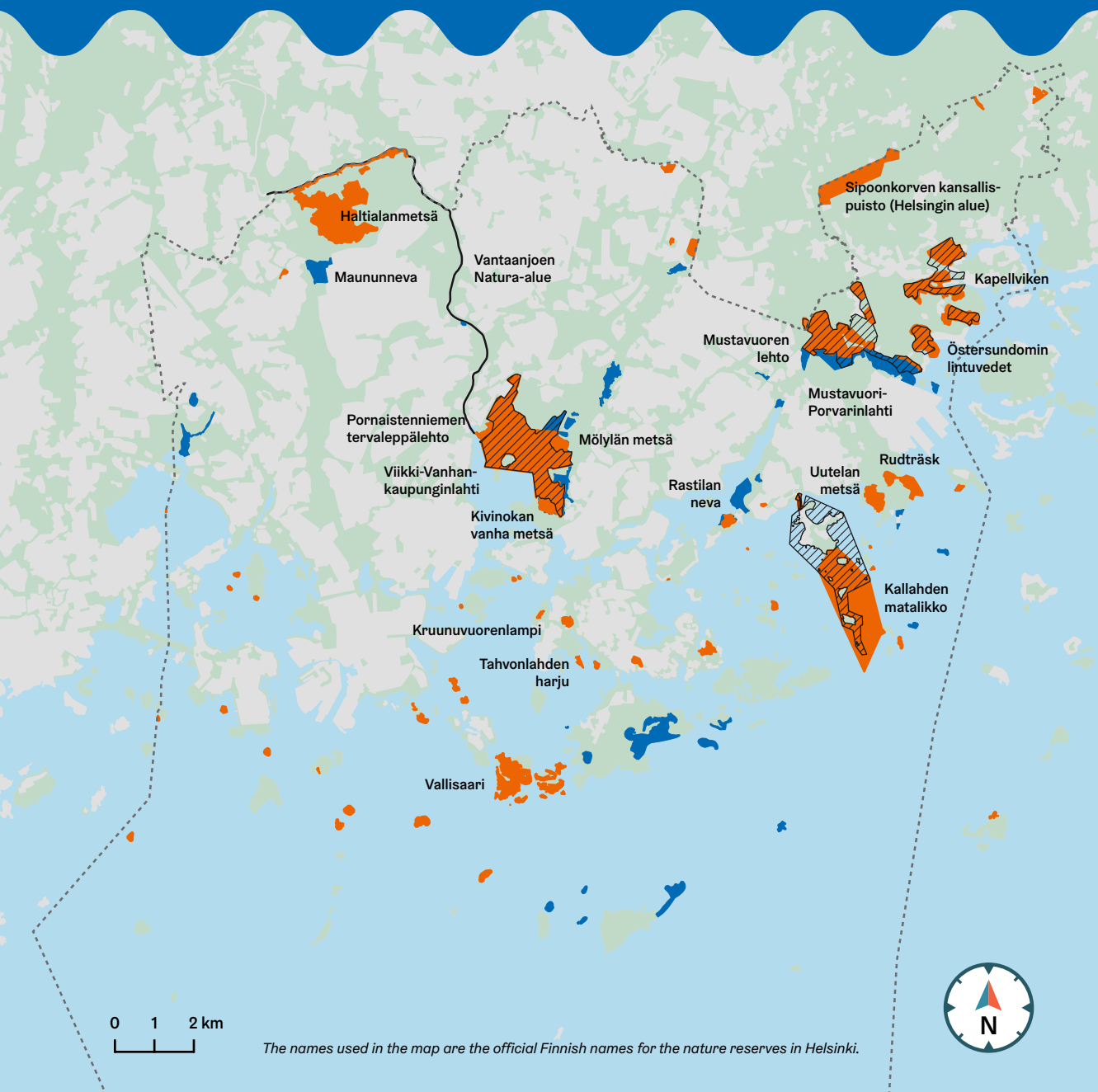
The Urban Environment Division continues to carry out closer cooperation in order to coordinate growth and the preservation of local nature in as early a planning stage as possible, in zoning and nature management alike. The City is surveying the prospects of introducing ecological compensation as a last resort as part of the mitigation hierarchy. A survey will be conducted on the street greenery network to complement the information material on ecological networks. The diversity potential of green areas will be established, the Nature Monitoring Plan will be implemented, and the monitoring of biodiversity will be developed further. Biodiversity-related criteria will be worked into procurements, and these criteria will be piloted on different suitable sites.

Nature reserves in Helsinki

Helsinki

Map 31 December 2022

Nature reserves
Nature reserves included in the Helsinki Nature Conservation Programme for 2015–2024
Natura areas
Green space
Residential and industrial areas
Helsinki city border



The names used in the map are the official Finnish names for the nature reserves in Helsinki.

Water protection

The water areas of Helsinki include extensive marine areas, as well as the freshwater areas of the Vantaa River, various creeks, ditches, ponds and springs. In accordance with the City Strategy, the state of the small water bodies and coastal waters of Helsinki will be improved and the revival of the migratory fish stock will be paid attention to. The maritime characteristics will be strengthened and opening the nearby archipelago to public use will be continued. In addition to the environmental policy, water protection in Helsinki is regulated by the Small Water Bodies Programme, the Stormwater Management Programme, the Instructions on Prevention and Control of Floods, the Baltic Sea Action Plan, and the Water Resources Management and Sea Management Plans.

Ecologically significant sea areas within the marine area of Helsinki were identified

The ecologically significant sea areas of the marine area of Helsinki were defined based on models of ecologically significant areas and thousands of observations on underwater biodiversity. Helsinki's major inner bays, Vanhankaupunginlahti and Laajalahti, are significant spawning sites of fish, as are the bay areas of the eastern inner archipelago. Abundant and diverse vascular plant communities were also observed in these areas. The areas are also important ecosystem service producers with regard to the filtering of land runoff. The greatest threat to the areas is posed by the intensive use of shore areas and the water area. Several diverse areas important to the occurrence of endangered Baltic Sea nature types were identified in the middle and outer archipelagos.

The seawater temperature was exceptionally high in late summer and early autumn, facilitating the formation of unusually late blue-green algae blooms in the area. However, there were also abundant blue-green algae occurrences in the Laajalahti and Seurasaarenselkä area throughout the summer. Despite the aforementioned, the overall nutrient concentrations and algae occurrences in the seawater were slightly lower than in the previous years, and on average, the seawater was also clearer. No completely anoxic areas of bottom water were found in the Helsinki area in 2022.

Preparations for a new Baltic Sea Action Plan started

Helsinki is committed to carrying out voluntary protective measures of the Baltic Sea in cooperation with the City of Turku through a shared Baltic Sea Action Plan. The 117 measures of the plan are divided between five objectives: clear coastal waters, a healthy marine habitat, clean and safe water transport, systematic use of water areas and active participation by the residents in the Baltic Sea region. The measures are divided extensively among the City divisions, in addition to which City of Helsinki construction services Stara, Helsinki Region Environmental Services Authority HSY and the Port of Helsinki are also involved.

The programme period of the current Baltic Sea Action Plan will end at the end of 2023. Preparatory work for a new action plan for the period of 2024–2028 was started in the autumn of 2022 with open workshops attended by network members and stakeholders involved in the Baltic Sea Challenge. Preparations for the Baltic Sea Action Plan will continue in 2023 with the

City's internal workshops. The focal points of the new action plan are sustainable sea use, eutrophication, harmful substances and littering, marine biodiversity and research cooperation.

Mapping out a new small water network

The Urban Nature themed map on Helsinki's city plan illustrates the City's ecological networks, forest network, meadow network and blue network. The blue network survey launched in 2021 involved specifying information related to the ecology and status of water bodies and converting it into a more readily usable form. The information on the blue network survey on the degree of naturalness of small waters, shores and the sea area make it easier to take natural values into account when planning land use, monitoring waters and otherwise developing the areas. The accuracy of the location data analysis was improved through land surveys in 2022. The mapping process revealed new creek beds and trickles, which were added to the Geographical Information System.

Several projects underway in the catchment area of the Vantaa River

Over a million people live in the impact area of the Vantaa River, and the river meanders for over 100 kilometres from Riihimäki to the Vanhankaupunginlahti bay in Helsinki. The Vantaa River is the auxiliary raw water source for the Helsinki Metropolitan Area. The load on the Vantaa River has decreased, and the ecological condition of the river is classified as satisfactory overall. The Kytäjoki river area and the upper reaches of the Kerava River are in an ecologically good condition. A good ecological condition would also be achievable in the lower reaches if the annual median of the overall phosphorus concentration were to reach a level of 60 µg/l.

Several water protection projects were underway in the catchment area of the Vantaa River. The Uudenmaan vesistökunnostusverkosto ('Uusimaa Water Body Restoration Network') project (2021–2023) involves identifying key stakeholders for water body restoration projects and improving cooperation between national and regional operators with the objective of putting marine and water resources management measures into practice. The Vantaanjoen nousu ('Rise of the Vantaa River') project (2020–2023) involves monitoring the migration behaviour of sea trout and European whitefish with radio transmitters attached to specimens. The project aims at, among other things, determining how sea trout and European whitefish behave in the Vanhankaupunginkoski rapids before and after the restoration of the eastern branch.

Water protection control focused on the tasks defined in the Water Services Act and reducing the adverse impacts of construction sites on water bodies

As with before, regulatory control resources had to be focused on tasks defined in the Water Services Act when the stormwater pipeline renovations made by the Helsinki Region Environmental Services Authority HSY brought on an influx of applications from persons who wished to be exempted from the connecting obligation. This workload reduced other work done on water protection control. The processing of the applications was transferred to the electronic Lupapiste service system, and the Trimble Locus Cloud supervision system was introduced in environmental supervision, which had an effect on the time used on actual supervision work. The control plan for 2022 featured fewer inspections than the previous plan, and these inspections were carried out. Because of task prioritisation, the number of inspections related to hazard reports was lower than the previous average.

Construction site water guidelines were prepared in cooperation with the authorities of the other cities of the Helsinki Metropolitan Area. A draft of the shared guidelines was completed, but due to a large amount of feedback, the finalising phase was postponed to 2023. The guidelines aim at setting ambitious objectives for the purification of construction site water before it is discharged into a stormwater drain or ditch, from where it ends up in urban brooks or the sea. All construction sites must aim at minimising their wastewater and making the water quality correspond with natural water when water is discharged into the environment. The wastewater generated must be treated so that it will not cause environmental contamination or have an adverse impact on the biota. In particular, wastewater generated at construction sites can have a high concentration of solids, and lowering this concentration has been found to be challenging.

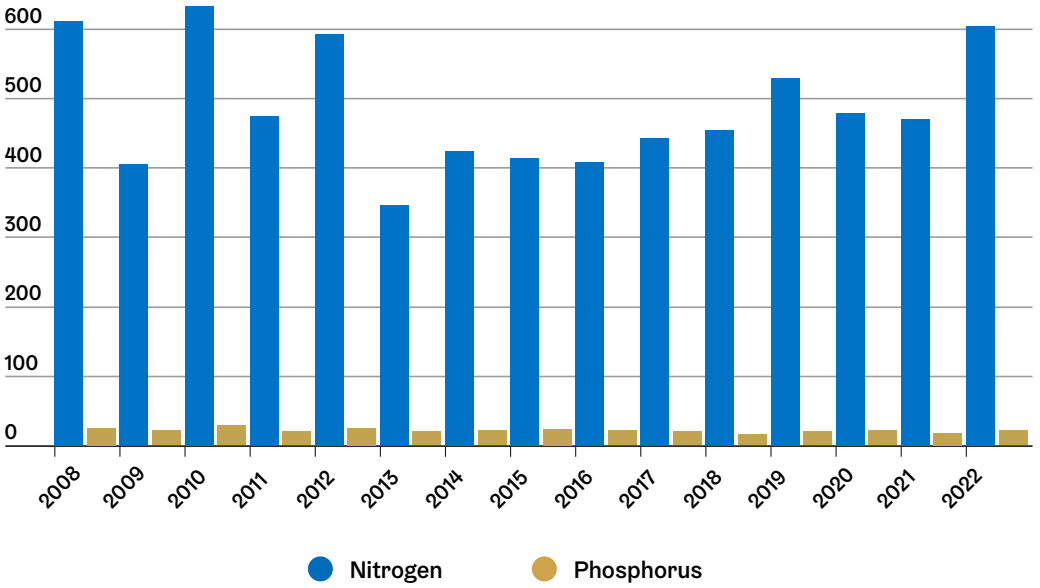
The environmental hazards caused to creeks from the drilling of geothermal wells have kept the environmental supervision authorities busy for several of the last few years. This challenge was met by preparing joint guidelines for the treatment of wastewater generated from geothermal drilling with HSY and the municipalities in the Helsinki Metropolitan Area in 2021. Implementing the guidelines proved to be a challenge, as environmental supervision authority received dozens of hazard reports on drilling sludge being released into water bodies. Geothermal heating has been gaining popularity, and it is important that wastewater containing solids (sludge) generated from drilling is being treated appropriately in order to avoid adverse impacts on water bodies.

Wastewater was treated efficiently

The amount of water pumped into the water supply network in 2022 was 93 million cubic metres in the Helsinki Region Environmental Services Authority's (HSY) water supply area, with 50 million cubic metres pumped into the Helsinki network.

Load to the Sea

Nitrogen and phosphorus load channeled to the sea from the Viikinmäki treatment plant, tons per year



The Viikinmäki Wastewater Treatment Plant in Helsinki is the largest water treatment plant in all of Finland and the Nordic region. The Viikinmäki plant, built within the bedrock, processes the wastewater of about 900,000 residents, not only from Helsinki, but also Central and Eastern Vantaa, Kerava, Tuusula, Järvenpää and Sipoo. The plant treated a total of 98 million cubic metres of wastewater, 70 million cubic metres of which came from Helsinki. Both the total amount of wastewater and the amount of wastewater from Helsinki were smaller than in the previous year. The Viikinmäki treatment plant met 88 per cent of the requirements of the environmental permit. The proportion of overflows in the combined sewage network in Helsinki was 0.08 per cent of the total amount of wastewater.

The 2022 treatment efficiency for phosphorus in Viikinmäki was 97 per cent. For biological oxygen demand, the removal efficiency was 96 per cent, and for nitrogen, 89 per cent. The treated wastewater is conducted through a 16-kilometre-long tunnel to the open sea. The phosphorus load from the Viikinmäki sewage treatment plant on the sea areas in front of Helsinki was 22 tonnes (+22 per cent from the 2021 level), and the nitrogen load was 605 tonnes (+29 per cent from the 2021 level). The treatment result was poorer than in the previous year, as the wastewater treatment plant had to bypass the biological section of the plant in the spring. The malfunction prompting this measure had to do with a decrease in the flow resistance of the process and snow melting due to rain. The bypassing wastewater underwent enhanced chemical treatment.

Eyes on the future

Water and sea protection in Finland is based on marine and water resources management plans. The plans are based on the Act on Water and Marine Resources Management, which in turn is based on the EU Water Framework Directive and Marine Strategy Framework Directive. Active action and cooperation are needed in all societal sectors in order for the objective of marine and water resources management – a good state of water bodies – to be attainable by 2027. Helsinki plays a significant role in the protection of surface waters, particularly with regard to the city's currents and inner bays in a situation in which improvements in the quality of the water of bays have ceased and the quality has started to decline in places in recent years.

Helsinki bears responsibility for the state and protection of the Baltic Sea. The sea is being threatened particularly by eutrophication, hazardous substances and littering, which have severe consequences for marine nature and biodiversity. The Baltic Sea Challenge was involved in preparing the new international BALTIPLAST project, which was launched at the beginning of 2023. The project was funded by the Interreg Baltic Sea Region Programme. The objective of the project is to identify, test and introduce measures that will promote circular economy solutions, as well as facilitate reducing the consumption of plastic and mitigating the amount of litter in the city's land and sea areas. The Baltic Sea Challenge is also involved in the new BALTICITIES project led by the Finnish Environment Institute, the objective of which is to improve the state of the coasts of Finland and the Baltic countries by strengthening cooperation networks between the coastal cities of different countries and different operators in society, and by increasing citizens' awareness of the state of the marine environment.

Energy

The production and consumption of energy play significant roles in achieving Helsinki's carbon neutrality target. 60 per cent of CO_2 emissions in the urban area of Helsinki are generated from district heat consumption and 16 per cent from the electricity consumption of properties. The CO_2 emissions of the Helsinki Group account for 13 per cent of the emissions of the entire urban area. Of this proportion, 95 per cent is caused by the energy consumption of buildings.

Helsinki's energy conservation work is based on the Carbon Neutral Helsinki Action Plan, which aims for the City to become carbon-neutral by 2030. Helsinki has been involved in the energy efficiency agreements made between municipalities and the Finnish government. These agreements are used to implement the measures required by the national energy and climate strategy at the municipal level.

Energy consumption causes considerable carbon dioxide emissions

The City accounted for 12 per cent of the consumption of electricity, 18 per cent of the consumption of district heat and roughly three per cent of the consumption of district cooling in the entire Helsinki urban area.

The energy consumption and CO_2 emissions of the Helsinki Group in 2021 and 2022 are presented in the table provided. The Helsinki Group's total energy consumption decreased by seven per cent from 2021, while its CO_2 emissions increased by two per cent. The decrease in energy consumption was brought about in part by energy conservation measures, which were carried out extensively across the entire group in preparation for the energy crisis and electricity shortages. The increase in CO_2 emissions is explained by the fact that the energy factor of Helen Ltd's district heat production increased by 17 per cent from 2021. This was due to the disruption in the availability of natural gas caused by the war in Ukraine, which resulted in the use of coal and pellets increasing in energy production in 2022.

Of the Helsinki Group's electricity procurements, 44 per cent now consist of green electricity, and this percentage is increasing every year. Green electricity is procured by operators such as Helsinki City Housing Company (Heka), Helsingin asumisoikeus Oy (Haso), Urheiluhallit Oy, Metropolitan Area Transport Ltd, Korkeasaaren eläintarhan säätiö sr (Korkeasaari Zoo) and Kiinteistö Oy Kaapelitalo. As for green district heating, the calculations for 2022 only take the zero-emission circulate heat bought by Korkeasaari Zoo into account.

The consumption of district heat among the Helsinki Group's properties decreased by six per cent and their electricity consumption decreased by 11 per cent from 2021. This was brought about in part by energy efficiency measures carried out on residential and service properties due to the anticipated energy crisis, as well as generally increased awareness and various campaigns for decreasing energy consumption.

The consumption of district cooling among properties decreased by 19 per cent from 2021. Correspondingly, there was less need for cooling in 2022 than in 2021.

Energy consumption and CO_2 emissions of the Helsinki Group in 2021 and 2022

Premises, owned by the city*	GWh, 2021	GWh, 2022	GWh, change % 2021-2022	CO_2 kilotonnes, 2021	CO_2 kilotonnes, 2022	CO_2, change % 2021-2022
Electricity	191	189	-1%	44.3	44.5	0%
District cooling	3.56	2.41	-32%	0.00	0.00	0%
District heating	391	384	-2%	74.4	85.4	15%
Total	**587**	**575**	**-2%**	**119**	**130**	**10%**
Premises, other (incl. subsidiary communities)						
Electricity**	260	215	-17%	43.5	28.2	-35%
District cooling	3.26	3.13	-4%	0.00	0.00	0%
District heating***	804	741	-8%	152	164	8%
Total	**1066**	**959**	**-10%**	**195**	**192**	**-2%**
Outdoor lighting, traffic lights						
Outdoor lighting, electricity	38.4	37.1	-3%	8.90	8.73	-2%
Traffic lights, electricity	1.21	1.19	-1%	0.28	0.28	-1%
Total	**39.6**	**38.3**	**-3%**	**9.19**	**9.01**	**-2%**
Public areas						
Electricity	3.88	3.48	-10%	0.90	0.82	-9%
District heating	4.69	5.11	9%	0.89	1.14	28%
Total	**8.57**	**8.59**	**0%**	**1.79**	**1.96**	**9%**
Traffic						
Metro traffic, electricity (green)	49.9	49.1	-2%	0.00	0.00	0%
Tramline traffic, electricity (green)	27.8	26.8	-4%	0.00	0.00	0%
Ferry traffic, fuel	6.64	6.53	-2%	1.71	1.69	-2%
Total	**84.3**	**82.4**	**-2%**	**1.71**	**1.69**	**-2%**
Vehicles and machinery						
Fuels	24.3	24.7	2%	3.68	3.74	2%
Electricity	0.01	0.15		0.002	0.035	
Total	**24.3**	**24.9**	**2%**	**3.68**	**3.78**	**3%**
Total	**1810**	**1689**	**-7%**	**330**	**339**	**2%**

* Service buildings directly owned by the City where consumption is monitored by the hour (in the Nuuka system with about 750 properties)
** Including 44% of green electricity in 2022 (in 2021 the share was 28% and in previous years this was not included in the calculation)
*** The district heating for Korkeasaari is zero-emission circulated heating (about 4 GWh)

The CO_2 emissions for 2021 have been calculated by using the product-specific emission factors of Helen Ltd, which are the following:

- 190 g/kWh for district heating
- 232 g/kWh for electricity (data for 2020; the factor for 2021 is not available)
- 0 g/kWh for cooling

The CO_2 emissions for 2022 have been calculated by using the product-specific emission factors of Helen Ltd, which are the following:

- 223 g/kWh for ditrict heating
- 235 g/kWh for electricity (data for 2021; the factor for 2022 is not available)
- 0 g/kWh for cooling

Electricity consumption in public areas decreased by nine per cent due to energy conservation measures carried out because of the energy crisis. By contrast, the consumption of district heat in public areas increased by nine per cent due to system overhauls carried out at the Pasila traffic terminal, which improved the functionality of the heating system at the terminal.

The electricity consumption of metro traffic decreased by two per cent, while the electricity consumption of tram traffic decreased by four per cent. This was due to a corresponding decrease in mileage brought about by longer departure intervals caused by a shortage of drivers. In relation to the mileage (seat kilometres), the consumption remained roughly at the level of the previous year.

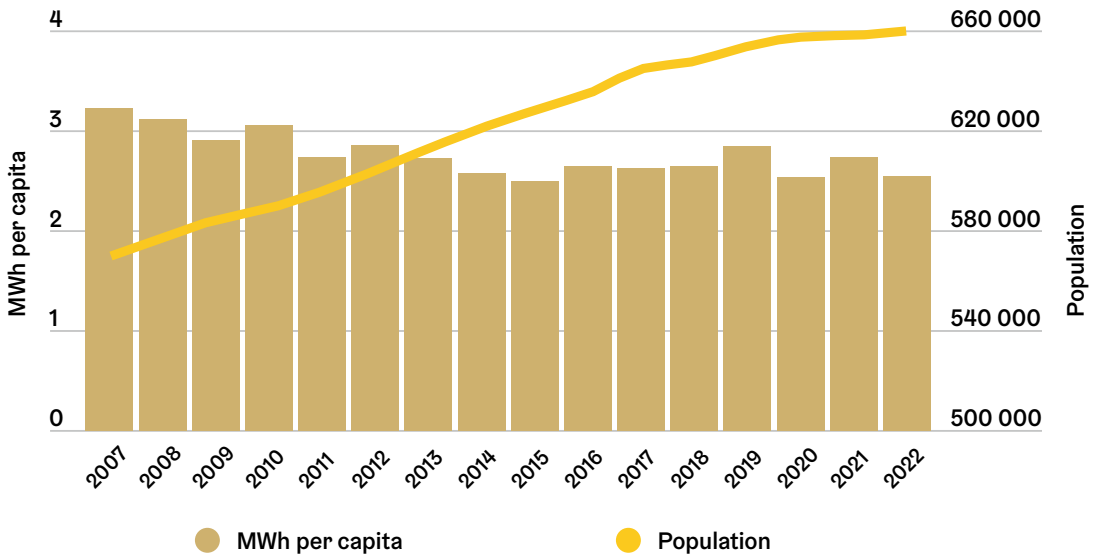
The fuel consumption of ferry traffic to and from Suomenlinna decreased by two per cent from 2021 due to the winter conditions and the fact that both vessels were docked in the shipyard, i.e. out of commission for a while. To make up for this, passengers were transported on the subcontractor-operated Suomenlinna II vessel, but no reports have been created on its fuel consumption.

District heating amounted to 67 per cent of the city's total energy consumption (1,130 GWh), electricity amounted to 31 per cent (522 GWh), district cooling amounted to 0.3 per cent (5.5 GWh) and fuels amounted to 1.9 per cent (31 GWh).

Energy consumption per capita at recent years' level

The graph provided shows the trends in the per capita energy consumption of the City's own operations for the last 16 years. During the period in question, per capita energy consumption has decreased by 21 per cent. Since 2019, energy consumption data has become more comprehensive, which is why the reduction achieved in per capita energy consumption during the period examined is greater in reality than presented here.

The development of the energy consumption of the City's own operations, divided by the City population



More energy-efficient construction than the national requirement

The standards and requirements regarding energy efficiency remained unchanged in 2022, i.e. the City's own new and renovation construction projects had to be planned and implemented with a level of energy efficiency higher than the national requirement. The average E value of service buildings commissioned in 2022 was 70 kWh_E/m^2a and the average of the E values calculated in connection with the building permit application was 74 kWh_E/m^2a, the requirement being 100 kWh_E/m^2a. In housing production, the average E value of new buildings commissioned in 2022 was 75 kWh_E/m^2a and the average of the E values calculated in connection with the building permit application was 72 kWh_E/m^2a, the requirement being 90 kWh_E/m^2a.

As with before, operators were required to select a heat pump system as the primary heating system if technically feasible and financially viable. Of all service buildings commissioned in 2022, 77 per cent had a heat pump as the primary heating form based on the surface area. In projects for which a building permit was applied for in 2022, the corresponding number was 87 per cent. In Helsinki Housing Production Department's projects for which a building permit was applied for in 2022, 50 per cent had a geothermal heat pump as the primary heating form.

As with before, buildings were required to be equipped with a solar power system. All of Helsinki Housing Production Department's new and renovation construction sites that were commissioned or for which a building permit was applied for in 2022 featured a solar power system. Nearly all of the Facility Service's projects also included a solar power system. Exceptions to this were protected buildings and projects the planning of which was started before the solar power requirement was set. More information about the environmental impact of construction can be found in the 'Construction' chapter of this report.

Investments in energy efficiency and renewable energy production

In addition to new and renovation construction projects, the City is installing solar power stations as separate investments on existing properties. In 2022, solar power systems were installed in Vuosaari House, Myllypuro Health Station, Kivitasku Service House, Herttoniemenranta Lower Stage Comprehensive School and Malmi Hospital. The combined solar power output of the service buildings is 1.7 MWp, and several new solar power systems are being planned.

The ESCO model pilot launched in 2020 continued at Kallio Office Building and the Nordsjö Rastis community centre, involving measures such as replacing ventilation units with more energy-efficient models and lights with LED technology. The idea of the model is that the business providing the ESCO service makes investments and carries out measures to conserve energy. The costs of the service, including the energy efficiency investment, are paid for with savings enabled by the reduced energy costs. The energy conservation target set for the pilot sites was exceeded during the first monitoring period.

The City's transition to using LED lights for public outdoor lighting made progress in 2022. Sizeable lighting overhauls, combined with lighting control and dimming, yielded an energy savings total of 2.7 GWh in 2022. The objective is for all public outdoor lighting (some 92,000 lights) to be LED-based and controllable by 2030.

Measures for improving energy efficiency

To prepare for the anticipated energy crisis, the City Manager of Helsinki appointed an energy preparation coordination group to support the City's divisions, enterprises and offices in promoting optimally effective energy conservation measures and preparing for an electricity shortage. The working group began its work in September 2022. As part of their energy preparation

work, the City's divisions carried out energy conservation measures, the realisation and effectiveness of which was monitored by the energy preparation coordination group. The core aspects of energy preparation were efficient communication, increasing awareness and increasing cooperation among in-house staff.

Cooperation with property management operators was intensified in order to improve the energy efficiency of buildings. The indoor conditions of the City's office premises were inspected and, where possible, indoor temperatures were set to the lower limits set in the guidelines and ventilation was made location-appropriate. Additionally, the usage times of saunas, heated football fields and artificial ice rinks at sports facilities were adjusted.

As an energy conservation measure in public areas, the lighting of locations such as streets and parks was dimmed where remotely controlled LED lights were in place. The lights of exercise routes were dimmed at nighttime. The use of street and staircase heating systems was restricted, with safety perspectives taken into account. Additionally, the Töölönlahti seawater pump was turned off.

The City's most prominent energy consumption sites were listed, and their energy conservation potential, as well as viable measures and investments, were surveyed separately.

In addition to the energy conservation work related to energy preparation, normal work to improve the energy efficiency of the existing building stock was continued as planned. In the heating period of 2021–2022, viable energy efficiency measures were carried out at energy-reviewed sites. An energy review was also ordered for 40 sites for the heating period of 2022–2023. Ordinary adjustment-technical measures presented in property energy reviews include setting temperatures to their guideline values, balancing the radiator network and adjusting the operating times and intake air temperatures of ventilation systems to correspond with their guideline values and in relation to the usage of the building. Viable investments include overhauling ventilation units or equipping them with heat recovery technology and switching to LED lighting.

Energy efficiency is promoted in projects as well

The Energiaviisas kaupunkikonserni ('Energy-wise Helsinki Group') project, which ended in 2022, supported four of the City's subsidiaries (Korkeasaari Zoo, Jätkäsaaren Rööri Oy, Urheiluhallit Oy, Kaisaniemen metrohalli Oy) in their energy efficiency work and identified measures that can be implemented to reduce CO_2 emissions. Examples of these include overhauling ventilation units, switching to LED technology in lighting, recovering heat from shower wastewater and many usage-technical measures that do not require investments.

The Energiaomavaraiset korttelitason alueelliset ratkaisut ('Energy Self-sufficient Block-level Areal Solutions') project funded by the Ministry of the Environment was launched in 2022. The project involves producing necessary and up-to-date information on solutions that are as energy self-sufficient as possible – even carbon-negative – for the planning and implementation of block-level areal energy investments.

Helsinki City Housing Company (Heka) is involved in the innovation programme of the HELENA project, which involves piloting low-carbon construction and housing solutions, such as a smart electricity storage, room-specific heating control and dynamic radiator valves. As part of this programme, a Heka building was equipped with a smart electricity storage made from old Tesla accumulators in 2022 to pilot the demand response of electricity.

In late 2022, preparations were started for Heka's carbon-neutral energy usage roadmap, which involves establishing guidelines and operating models – particularly by utilising lessons learned

from the HELENA project – for the systematic scaling of energy solutions in Heka's property portfolio.

Helen Ltd has already achieved its energy conservation objectives based on the energy efficiency agreement

Helen Ltd's goal is to improve energy efficiency by 5.4 per cent from the 2015 level by 2025. In 2022, the most significant measures with regard to the energy efficiency of production were the construction of the Katri Vala heat pump plant's seventh heat pump and raising the connection power for district and internal cooling, which facilitated the utilisation of waste heat from sources such as data centres. On the side of energy distribution, the district heating network was renovated and management of the network was improved by utilising artificial intelligence. Helen's energy conservation objectives based on the energy efficiency agreement have been exceeded.

Helen also allocated resources to digital services that support residents in energy conservation. Helen launched its Yritys Helen service for corporate and housing company clients that facilitates monitoring the energy consumption of properties, as well as a turnkey energy renovation service for housing companies. The number of users in the Oma Helen service increased to an impressive 390,000 as people became more motivated to monitor their energy consumption.

Approximately half of the energy conservation targets achieved

Helsinki is committed to an energy conservation target of 61 GWh in the municipal energy efficiency agreement (KETS), while subsidiary companies of the City that own rental apartments are committed to an energy conservation target of 55.7 GWh in the energy efficiency agreement for rental apartments (VAETS) during the contract period 2017–2025. The contractual obligations are implemented with energy conservation measures, the energy conservation effects of which are reported to Motiva annually.

By the end of 2025, the total energy savings achieved by the known energy efficiency actions (KETS + VAETS) of the City will have amounted to approximately 57 GWh, which is slightly over 49 per cent of the total conservation target for the entire contract period. The assessment of some energy conservation measures carried out during the agreement period is still in progress, so they are not yet taken into account in the reporting.

Eyes on the future

The effectiveness of the measures carried out to prepare for the energy crisis will be assessed in the spring of 2023, and viable measures will be put to permanent use.

To increase the smart capabilities of the City's service buildings, their building automation systems will be connected in phases to the City of Helsinki's information network (Raunet). This will facilitate remote monitoring and management of the building services of properties to optimise the permanence of their energy efficiency and indoor conditions.

In the autumn of 2022, Heka introduced its new energy management system, Enerkey, which will enable the company to utilise AI-based data analytics to chart energy conservation potentials.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Construction

Plans were drawn up for more than 700,000 square metres of floor area in Helsinki, nearly 395,000 square metres of which was designated for supplemental construction. Plot project reservations and plot conveyance competitions were prepared for approximately 4,000 apartments. Plots were conveyed for housing construction purposes for roughly 2,770 apartments. Construction projects for more than 5,000 apartments were started in the City of Helsinki area, approximately 2,560 of which are located on plots conveyed by the City. The Urban Environment Division commissioned the construction of some 600 apartments, which is clearly less than the set target of 1,500 apartments. Among the key reasons for this underperformance were the market disturbances caused by Russia's war of aggression strongly impacting the construction sector, making materials less readily available and having a substantial impact on the cost levels of construction.

The City of Helsinki's detailed planning work involved developing the assessment of the low-carbon qualities of the City's detailed planning as a method of calculating the climate emissions of zoning. These calculations can be used for reporting the overall and floor area specific climate impact of the City's plans, provided that such calculations have been carried out in the planning process. This method has since been expanded into a national-level development project joined by several cities.

The City continued making significant investments in railway traffic. The construction of the Jokeri Light Rail made more rapid progress than anticipated, and the project may be completed up to a year ahead of the schedule set in the project decision. The Crown Bridges light rail project and the Kalasatama–Pasila project made good progress as well. Preparations for the next light rail project to be carried out, the West Helsinki tram line, were taken forward.

Low carbon emissions in the lifecycle of the City's own buildings

The process of commissioning of systematic building lifecycle carbon emission calculations as part of the City's own construction projects was continued in 2022. These calculations are used to steer construction projects in a low-carbon direction and chart the baseline level for future limit value work. To increase general know-how in the field and clarify the influencing opportunities of different planning and design fields, planning groups were provided with info events at the start of each project. In the summer of 2022, the City published its own instructions to complement the Ministry of the Environment's calculation method with the purpose of unifying calculations and their reporting.

Like in previous years, the carbon footprint was used as a minimum requirement and discretionary quality comparison criterion in lifecycle, lease and 'Design and build' projects based on an implementation competition. Carbon footprint comparisons were also carried out more frequently than before to support decision-making in situations in which the implementation options were the demolition or the renovation of a building.

In 2022, the City began surveying emissions reduction measures related to materials in particular. Ways to reduce product and material-specific emissions were surveyed by means such as establishing the carbon footprints of the most commonly used structure types and drawing up proposals for lower-emission material and product alternatives for them.

Steering the environmental objectives of the City's own building construction projects

The City steers the ecologically sustainable construction objectives of its own building construction projects with a unified operating model, which was developed into versions suitable for renovation and upgrade projects in 2022. The energy efficiency requirements for construction projects are discussed in the 'Energy' chapter of this report.

Instead of a dedicated operating model, some projects use environmental classification systems. The first Building Information Foundation (RTS) classified housing production buildings were completed in 2022, but their official certification will not be carried out until early 2023. RTS buildings were also completed in the Facility Service in 2022. The Nordic Swan Ecolabel pilot of the Facility Service proceeded to the construction phase in 2022.

The commissioning of the environmental documentation scheme for worksites introduced in 2021 was continued in 2022. The environmental document sets requirements for contractors in terms of reducing the environmental impacts of the worksite, including the requirements of the Green Deal for emission-free worksites. More information regarding the fulfilment of the Green Deal for emission-free worksites can be found in the 'Procurements' chapter of this report.

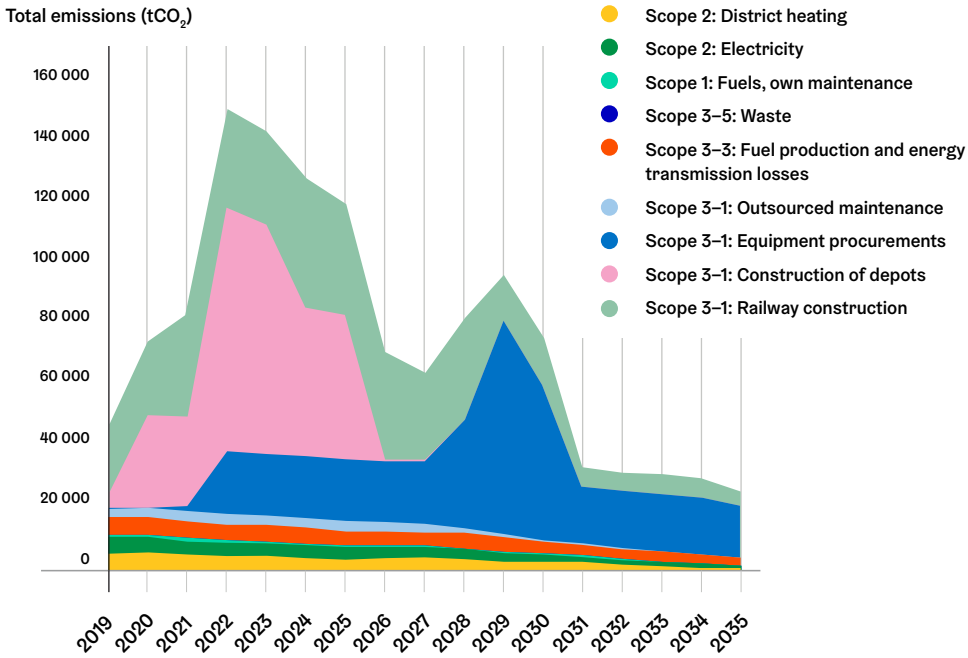
Low carbon emissions in infrastructure construction

The City of Helsinki has participated actively in the development of a national emissions database for infrastructure construction. The database provides unbiased information about the climate impacts of construction materials, products, transport operations and worksite operations used in Finland, thus facilitating comparative and open data based carbon footprint calculations in infrastructure construction projects. A method for assessing the carbon footprint of seedbeds and other green structures is being developed in cooperation with the Finnish Environment Institute to be attached to the emissions database. For developing the emissions database, the City of Helsinki has piloted infrastructure emissions calculation in its street and park plan and tram track emissions calculations. These results are utilised further in the development of low-carbon infrastructure design and construction.

In order to achieve the emissions reductions objectives of the Carbon Neutral Helsinki Action Plan, emissions generated in the pre-construction of the former Malmi Airport area are being reduced. Based on the development work carried out, the emissions can be halved from the level of the preliminary pre-construction plan between 2020 and 2030.

In infrastructure construction, preparations were made for the introduction of low-carbon concrete in future infrastructure projects in accordance with the Carbon Neutral Helsinki Action Plan. A preliminary report on reducing the carbon footprint of concrete used in infrastructure construction was completed in 2022. Low-emission concrete has already been tried in the City's projects. In the Kalasatama–Pasila project, the carbon footprint of concrete pile slabs was reduced by roughly one quarter through the use of lower-emission concrete.

The assumed emissions progress of Metropolitan Area Transport Ltd in 2019–2035



In connection with surveying the condition of bridges, the City implemented lifecycle-sustainable and low-emission repair planning. The same lifecycle-sustainable property management principles will be expanded to become part of other engineered structures as well.

As part of the Carbon-Neutral Urban Transport 2030 programme of Metropolitan Area Transport Ltd, the City surveyed the overall picture of emission-intensive railway construction sites by utilising carbon footprint calculation and identified measures for reducing the carbon emissions of urban transport in 2022.

Steering the environmental objectives of infrastructure construction

In 2022, the City carried out development work to connect environmental matters to the planning and implementation documentation of infrastructure construction. Templates for an environmental matter checklist and an environmental document to be created in planning projects were completed, and their use is being tested in street and park planning projects.

Several reports were created for the development of mass management, material efficiency and low-carbon infrastructure construction, such as reports on the cost and material divisions of infrastructure construction projects and their greenhouse gas emission information. These reports contribute to the development of operational steering. Circular economy in infrastructure construction is discussed in more detail in the ‘Circular economy’ chapter of this report.

The Helsinki Design Manual was updated with regard to sustainability. A new content module entitled ‘The vegetation of a public urban space as a constituent of the Sense of Helsinki’ was added to the ‘Helsinki Spirit’ section. The plant palette was updated as well. Design instructions for uncovered and heated stairs for

Case: Kalasatama–Pasila

Utilising low-emission materials and design solutions reduces climate emissions. In the Kalasatama–Pasila tramway project, successful mass circulation and recycling, the use of low-carbon concrete and structural optimisation played key roles in the reduction of emissions. The carbon footprint of concrete pile slabs was reduced by roughly one quarter through the use of lower-emission concrete. The lifecycle of the whole was taken into account through measures such as anticipating future electricity consumption needs in the area. In order to minimise the need to perform excavations under the completed rail structure, electricity cable pipes were installed proactively for later use. In order to make maintenance easier, only low-maintenance plant species were selected for the plant rail. Recycled masses, such as substrates and asphalt, as well as recycled stones, reduce the need to use virgin materials. Over the course of the year, the City managed to recycle all recyclable materials in the project. Nearly 83 per cent of all waste was recycled.

outdoor facilities were also completed and will be added to the Design Manual. The instructions for outdoor stairs depict the costs and emissions of different stair types during their lifecycle.

Helsinki was actively involved in the national UUMA4 programme for promoting circular economy and the use of recovered materials in groundworks, as well as reducing climate emissions in infrastructure construction.

Taking biodiversity into account in construction

The prioritisation of the City's efforts to combat invasive species has been instructed to correspond with the new legislation regarding invasive species and the invasive species situation of Helsinki. In 2022, the City published its updated prioritisation plan for combating invasive plant and snail species. The Urban Environment Division and Stara have created 17 instruction cards for combating invasive species to be used in the planning and construction phases of projects. The general work account procedure for street and park projects has also been updated. Occurrences of invasive species have been charted in 12 project areas.

In major railway projects, tree felling in the project areas has posed a challenge. The number of trees felled is being compensated for with more diverse tree plantings and new green solutions and surfaces that pay special attention to diversity.

A significant diversity act was carried out at the Jokeri Light Rail depot in Roihupelto, as a stock of the endangered and strictly protected Anthyllis vulneraria ssp. polyphylla, a subspecies of the common kidneyvetch that has only grown in one place in Helsinki, was transferred and planted there. This new habitat supports endangered insects. 2022 was the last year of construction in the Jokeri Light Rail project, involving carrying out several diversity-supporting procedures, such as sowing diverse meadows. More information about the City's work to preserve biodiversity is provided in the 'Securing biodiversity' chapter of this report.

Eyes on the future

Building construction is subject to significant emissions reduction objectives. Methods for reducing material-specific emissions in particular and their cost effects will be surveyed through various pilots in the coming years. In the future, the City's own new buildings will continue to be required to have a high level of energy efficiency, while upgrade projects will be required to yield a significant improvement from the baseline situation. Locally produced renewable energy will also be required in the future. The steering of the City's low-emission infrastructure planning and construction commissioning is developed through the co-development of infrastructure calculation and emission calculation methods.

The requirements set in the Green Deal for emission-free worksites will be made significantly stricter in the near future. These requirements, such as those related to the use of fossil-free fuels, will also be piloted in the coming years before they are categorically set for all of the City's own construction projects.

The increasing of biodiversity is one rising theme in construction. Biodiversity can be promoted in the built environment and its planning, implementation and maintenance in a variety of ways, which has already been observed in major infrastructure projects, among others.

Transport

The City Strategy aims for the City of Helsinki's work on carbon neutrality to focus on the electrification of the transport system and the promotion of sustainable and smart transport solutions. When the strategy is implemented, detrimental traffic emissions will also be reduced significantly.

Helsinki's cycling network was expanded and people enjoyed summer streets

The objective of the Bicycle Action Plan 2020–2025 is for Helsinki to be a year-round cycling city for all ages. The aim is also to increase the proportion of journeys taken by bicycle to at least 20 per cent by 2030.

Helsinki's cycling network was expanded in connection with the construction of the Jokeri Light Rail. The most significant project in 2022 was the completion of the Viikinbaana route from Roihupelto to Oulunkylä. A roughly one-kilometre section of the northern Baana route was also completed on Maaherrantie in Oulunkylä.

Of the 142-kilometre target network in the city centre, 65 kilometres were completed or under construction in 2022. Similarly, of the 148-kilometre target for the Baana cycling network, 27 kilometres were completed or under construction.

Four busy streets in Southern Helsinki were transformed into verdant summer streets in 2022. Pedestrians were given the highest priority on Kasarmikatu, Pieni Roobertinkatu, Korkeavuorenkatu and Erottajankatu, and the streets were closed from other traffic.

The City of Helsinki's Environmental Services published a website entitled 'Move sustainably' for Helsinki residents. The website provides information related to incentives for using an electric car for everyday transport, shared use transport services and sustainable mobility.

The number of electric buses almost doubled

Helsinki Region Transport (HSL) aims to cut local emissions and carbon dioxide emissions from public transport by more than 90 per cent (2010–2025). The goal is also for at least 30 per cent of HSL's buses (approximately 400 units) to run on electricity by 2025. Over the course of 2022, HSL commissioned roughly 150 new electric buses, increasing their total number to 328. The electric buses accounted for 18 per cent of the total kilometres driven by the bus fleet.

The number of passengers using public transport increased in 2022 from the previous year but is yet to return to the pre-pandemic level. In 2022, the number of passengers increased by 25 per cent on the metro, 26 per cent on buses, 32 per cent on trams and 33 per cent on local trains from 2021 in the HSL area. However, HSL's passenger numbers in 2022 were roughly 24 per cent lower than in 2019.

The city bike season started on 1 April and continued until the end of October. In 2022, the Helsinki Metropolitan Area had a total of 577 city bike stations, 347 of which (3,470 bikes) were inside the borders of Helsinki. The city bikes were used for approximately 2.1 million journeys in Helsinki, the average distance of which was 2.3 kilometres. According to HSL's customer survey, factors such as changed transport needs, remote work and residents using their own bikes have decreased the use of city bikes in recent years.

The Helsinki region ranked fourth in the international BEST – Benchmarking in European Service of Public Transport survey. The survey compared customer satisfaction ratings of the public transport of 11 European cities. 73 per cent of customers in the HSL area were satisfied with public transport in 2022.

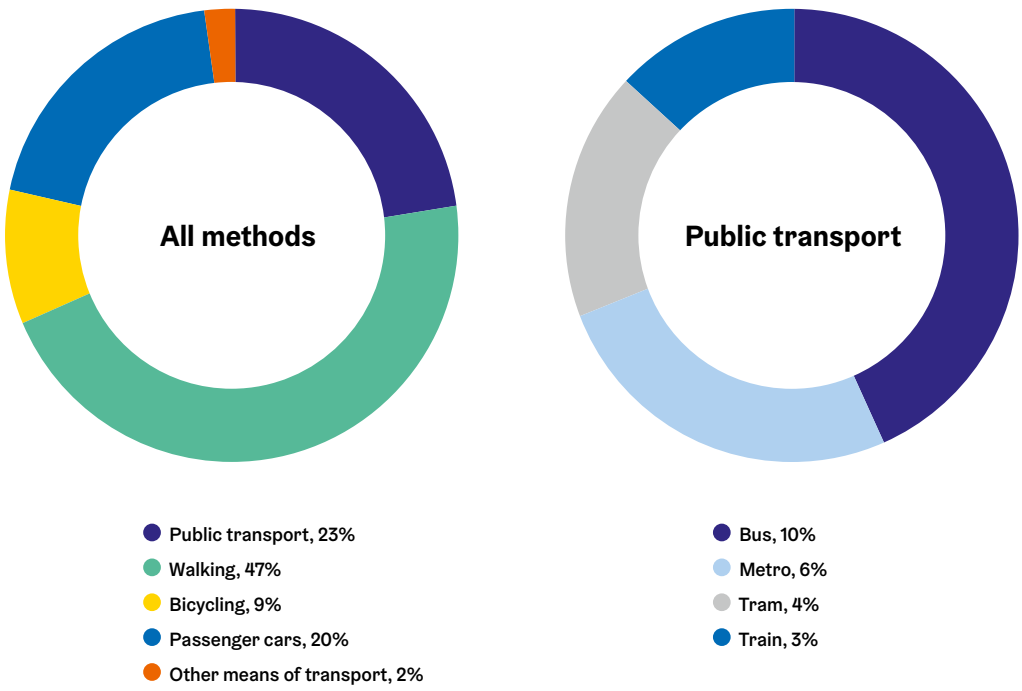
Helsinki tendered out an expansion of its electric car charging network

Helsinki's goal is for electric cars to account for 30 per cent of the vehicle population of Helsinki in 2030. The number of electric cars continued to increase in 2022. By the end of the year, there were 17,227 plug-in hybrids and 7,873 electric cars in operation, i.e. 25,100 rechargeable passenger cars in total. Rechargeable cars accounted for approximately 11.4 per cent of all cars in operation in Helsinki. The percentage was 8.4 in 2021 and 3.4 in 2020.

The public areas in Helsinki have roughly 110 public charging points for electric cars. In the spring of 2022, Helsinki tendered out an expansion of its electric car charging network. The contractor chosen for the task is Helen Ltd, which will build 48 charging stations for private cars and eight stations for taxis, with a total of more than 150 charging points, by the end of 2023. Additionally, there are semi-public and private charging points in Helsinki.

Distribution of modes of transport

Helsinki residents' primary mode of transport within the city, per cent of journeys in a day *



*percentages rounded to integers

The City Board decided on a new parking policy

The City Board approved the Helsinki Parking Policy in October 2022. The aims of the new policy include a high-quality urban life and environment, accessible and competitive businesses, and promoting climate and carbon neutrality objectives. The monthly fees for all resident and business parking permits will be increased by a total of 30 euros in 2023. Helsinki will adopt a service level based parking pricing model in December 2024.

The City has launched a delivery traffic parking permit trial to run from 2022 to 2024. The permit allows drivers to park in a loading area for 20 minutes. Low-emission vehicles qualify for a 50 per cent discount on delivery traffic parking fees.

The City Strategy highlights the importance of smart transport solutions for ensuring smooth everyday life. Smart transport and the collection of up-to-date traffic data have been promoted in Helsinki through the Intelligent Transport System Development Programme. The City continued developing its situational awareness and statistical and monitoring image service for traffic data (LIDO-TIKU) in 2022 by means such as collecting traffic data.

Rail transport projects making progress

The construction of the Crown Bridges tramway and the Kalasatama–Pasila tramway proceeded as planned in 2022. The construction of the Jokeri Light Rail was roughly 98 per cent complete at the end of 2022. The Jokeri Light Rail will be completed in the autumn of 2023.

A new tram connection was opened on Pasilankatu in August 2022. The connection facilitates direct tram traffic between Pasilansilta and the southern section of Pasilankatu.

Infrastructure construction for the Ilmala tramway connection was completed in October 2022. In addition to building tram tracks, the project involved overhauling municipal infrastructure and building new street space. HSL began transport operations on the built section of tram line 9 in October.

In late 2022, a new turnaround and northern terminal point for trams were completed in Meilahti. The terminal point is located on Haartmaninkatu, at the edge of Rosina Heikel Park. The project also involved overhauling cycling paths and the municipal infrastructure of streets.

A draft of MAL 2023, the Helsinki region Land Use, Housing and Transport Plan, was completed and circulated for commenting in the autumn of 2022.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The number of cars in traffic use decreased

The number of Helsinki residents owning a car increased by 0.15 per cent (car density = 429 cars / 1,000 inhabitants). Conversely, the number of cars in traffic use decreased by 1.84 per cent from the previous year (330 cars / 1,000 inhabitants). Since 2017, car density has increased by 4.24 per cent, while the density of cars in traffic use has increased by 0.20 per cent.

On an average June weekday, the border of the Helsinki peninsula was crossed by 26,000 cyclists, which is 17.2 per cent less than in 2021. Motor vehicle traffic statistics for 2022 were not yet available at the time of creating this report.

Eyes on the future

The population of Helsinki is growing and land use is becoming denser, making it increasingly important to control the harmful impacts of traffic. Achieving Helsinki's emissions reduction objectives requires effective measures in the transport sector. In addition to promoting low-emission transport, the mileage of vehicle traffic must be decreased. Key factors include land use planning, promoting sustainable modes of transport, pricing and increased services related to transport.

The City must prepare for an increasing amount of alternative fuel sources by means such as developing its distribution infrastructure. In addition to the electrification of transport, other low-emission fuel sources, such as biomethane and pure hydrogen, must be taken into consideration in planning.

Helsinki will focus on developing tram traffic by planning and implementing light rail projects. In a tram network city, the urban structure grows denser particularly at tram traffic hubs.

Air protection

The air quality in Helsinki has improved over the last few decades, and it is fairly good at an international level. However, exhaust emissions from traffic, street dust and emissions from burning wood in domestic fireplaces continue to be harmful to people's health and comfort. Air protection is promoted in Helsinki with an Air Quality Plan that entered into force in 2017. The programme features 48 measures for avoiding adverse impacts on air quality. A new Air Quality Plan is being prepared and will be completed in the summer of 2024. The City is also actively involved in national air protection work.

Exhaust emissions on decline

In 2022, nitrogen oxide emissions from exhaust fumes increased slightly from the two preceding years. In 2020 and 2021, the COVID-19 pandemic clearly reduced people's use of transport and thus traffic emissions. However, exhaust fume based traffic emissions have clearly decreased in the long term, and this decline is expected to continue due to the development and electrification of transport technology. Replacing buses with lower-emission ones has played a key role in the improvement of air quality. The current EU limit value for nitrogen oxide has no longer been exceeded in recent years, nor is it expected to.

Limit values potentially to be tightened

The European Commission published its new Air Quality Directive proposal in the autumn of 2022. If the proposal is approved, the binding EU limit values for air pollutant concentrations will be significantly tightened in 2030. The proposed limit values are based on the World Health Organization's (WHO) new health-based guidelines that entered into force in 2021 and are even stricter than the limit value proposals. They are largely exceeded even in Helsinki, especially in terms of nitrogen dioxide, inhalable particles and fine inhalable particles.

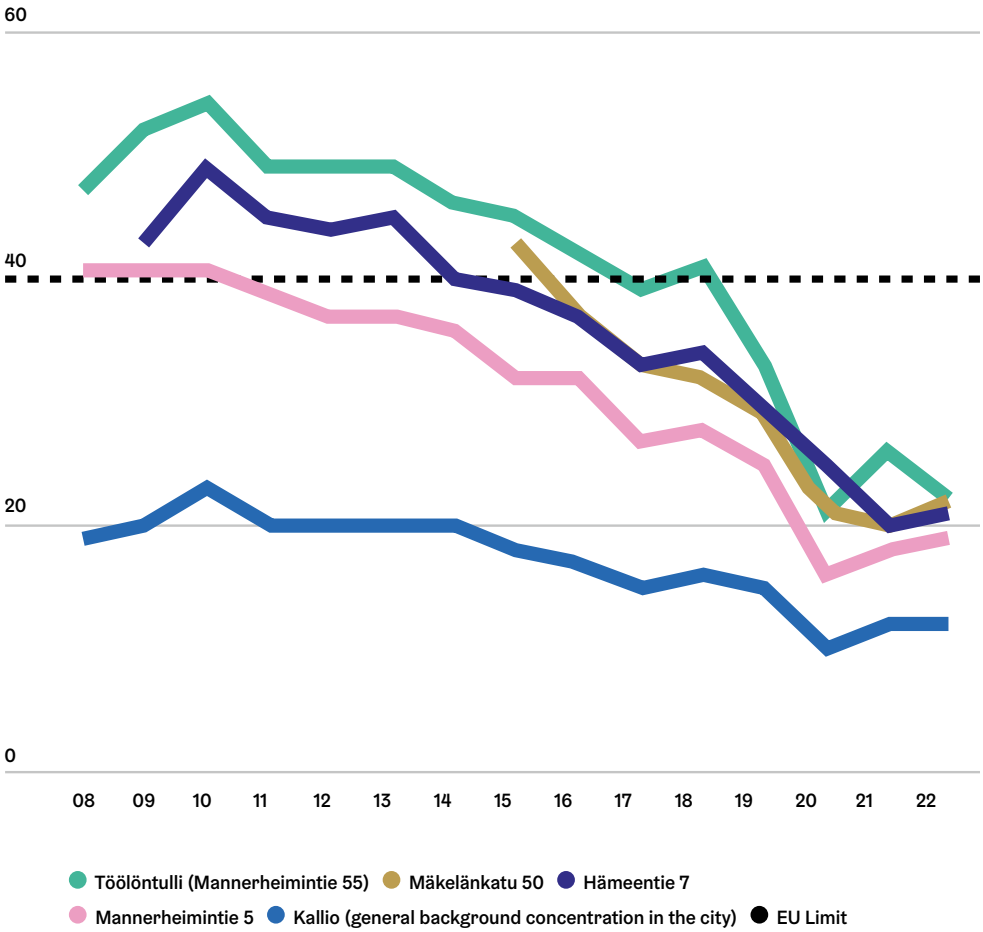
Street dust continues to pose a challenge

In addition to direct exhaust emissions, traffic also produces street dust. The limit values for street dust, i.e. inhalable particles, have not been exceeded in Helsinki in recent years, but the risk of exceeding them still remains. Very dusty days continue to occur, particularly in spring, and the national guidelines and the WHO's new guidelines are exceeded. The dust volumes in the spring are also significantly affected by the weather conditions and snow volumes in the spring and winter.

For several years now, Helsinki has participated in research collaboration projects on the formation of street dust and measures to reduce it. The measures that have proven to be the most effective have been adopted in practical street maintenance. Research has shown that studded tyres cause a very significant proportion of street dust by grinding on the pavement. Accordingly, the City has set an objective to reduce the proportion of studded tyres among winter tyres. The benefits of friction tyres have been highlighted in a broad communication campaign in three autumns already. A studded tyre prohibition trial pertaining to through traffic was started last autumn on Lönnrotinkatu. The purpose of this trial is

Nitrogen dioxide (NO_2) concentrations in ambient air

Annual average nitrogen dioxide (NO_2) concentrations measured by HSY's monitoring stations and passive samplers, µg/m³.



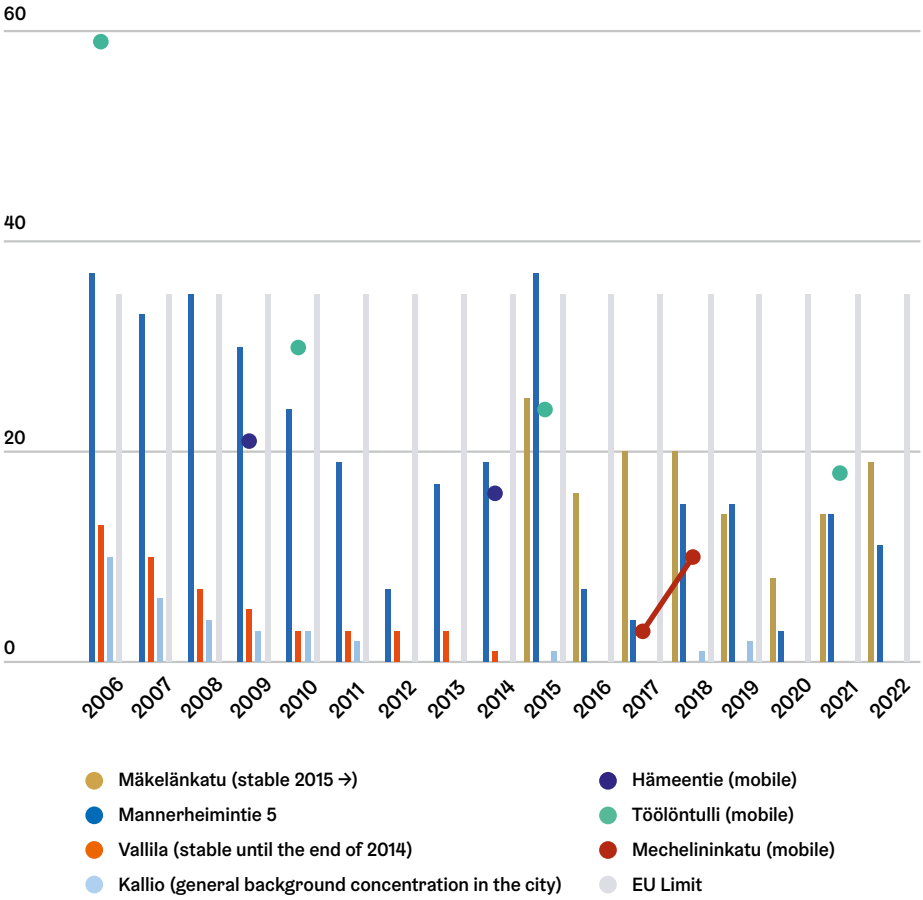
to monitor the impacts of the prohibition on aspects such as air quality and the proportions of studded tyres at large. The City will only acquire friction tyres for its own passenger cars and vans for winter.

Wood burning causing adverse impacts on air quality in detached house areas

Burning wood in fireplaces causes particle, black carbon and PAH compound emissions, particularly in detached house areas. Increased wood burning in the fireplaces of people's homes, brought about by the energy crisis, reduced air quality in detached house areas in winter, particularly during evenings and weekends. Helsinki is campaigning for cleaner burning methods by communicating via social media and the City's info screens. The City is also participating in a research project aiming to reduce the emissions of sauna stoves.

Particulate matter (PM_{10}) concentrations in ambient air

The number of days when the limit value level (50 µg/m³) for particulate matter (PM_{10}) was exceeded in the air quality measurement stations in Helsinki. The limit value is exceeded if the number of days with PM_{10} levels above 50 µg/m³ is more than 35/year.



Eyes on the future

Thanks to advancements in vehicle traffic technology and the electrification of vehicles, direct exhaust emissions have decreased. However, street dust remains a challenge. The densification of the city along busy traffic routes increases the need to direct even greater efforts towards street dust prevention in the future. The burning of wood in fireplaces will not decrease in the near future, which is why efforts must be made to reduce its emissions.

Noise abatement

The City of Helsinki's latest traffic noise mapping project was completed in 2022. The most significant source of noise in Helsinki is road traffic. Roughly 39 per cent of Helsinki residents live in areas in which the average daytime noise level of road and street traffic exceeds 55 dB. Six per cent of Helsinki residents are exposed to tram noise, one per cent to railway noise and slightly over one per cent to metro noise. Compared to the situation five years ago, the number of residents exposed to road traffic noise has slightly increased due to new construction. The exposure calculations do not take the noise abatement measures of buildings into account. Therefore, the noise mapping results do not show the number of residents exposed to road traffic noise indoors, but they are indicative of how many residents' living area is impacted by noise.

The city's soundscape was improved

The City's work on improving the soundscape is steered by its Noise Abatement Action Plan, which is drawn up based on the noise mapping results for a five-year period. The next Noise Abatement Action Plan will be completed in the summer of 2024.

In 2022, the city's soundscape was improved in many ways. Harmful noise was prevented through land use and transport planning to secure a healthy and comfortable living environment and sufficient noise abatement. Efforts were made to reduce noise emissions from motor traffic, e.g. by promoting the use of friction tyres and influencing driving speeds. For the summer, four busy street sections in the city centre were transformed into verdant places of leisure in which pedestrians were catered to first and foremost. Noise from public transport was decreased through measures such as installing new deep groove rail switches and honing and lubricating tracks. For its part, HSL significantly increased its number of electric buses. Planning work for the Vanha Porvoontie noise barrier was continued. The implementation of noise barriers is a slow process due to insufficient resources.

Events returned to the city

After two exceptional years, large open air concerts were once again held across Helsinki. In 2022, the City conducted a resident survey to chart experiences with open air concerts and their impacts among residents of the most significant event areas, the Olympic Stadium, Kaisaniemi, Tokoinranta and Suvilahti, and their surroundings. The majority of respondents reported that in their opinion, concerts enliven their home district, improve the economy of the city, businesses and services, and improve the reputation of the city. They also found music noise to be less disruptive than in the 2018 survey. However, residents living near the Olympic Stadium found the noise more disruptive than on average. The results of the resident survey were utilised in the City's end time policy for outdoor concerts for 2023–2025. The policy sets a maximum number and end times for concerts that end after 22.00 on Kansalaistori square and in Töölönlahti Park, Suvilahti, the Olympic Stadium, Kaisaniemi and the former Malmi Airport area.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Prevention of harmful noise as cooperation with the authorities

In addition to traffic and outdoor events, harmful noise is caused by construction sites, some industrial plants, restaurants and the HVAC technology of buildings, for example. The Environmental Protection Act provides for environmental permit, registration and notification obligations, the purpose of which is to prevent harmful noise generated from industrial plants and temporary functions. Furthermore, the environmental protection regulations of Helsinki set a notification obligation for all temporary functions causing harmful noise, as well as restrictions on nighttime noise.

Residents submitted a total of 240 reports on harmful noise to the environmental protection authority, but only the 122 most acute cases could be processed. Additionally, residents submitted a total of 183 pieces of feedback on outdoor events. In addition to the environmental protection authority, harmful noise prevention was supervised by health protection and building control authorities.

Eyes on the future

As the city grows denser, resources must be allocated to sufficient noise abatement and soundscape planning in the future as well. The importance of areas and places with a calm, revitalising soundscape will be highlighted even more.


JUICY

Procurements

The annual volume of Helsinki's procurements is roughly four billion euros. In accordance with its Procurement Strategy, the City is committed to promoting responsibility and acting as a pioneer in the development and commissioning of new solutions. Procurements that take environmental, social and economic responsibility into account form a basis for a responsibly operating capital city. In 2022, the focus of developing responsible and impactful procurements was particularly on reducing climate emissions and harmful substances, and the development of taking responsibility into account in the procurement process.

On average, the environmental criteria were used in around 52 per cent of the procurements of the City's divisions and enterprises in 2022 when examined as individual procurements. There continue to be differences between procurement units in the use of environmental criteria: for example, nearly 100 per cent of the procurements of Palvelukeskus Helsinki and the Culture and Leisure Division and roughly 80 per cent of the procurements of Stara utilised environmental criteria, while for some procurement units the corresponding percentage was somewhere between 20 and 60. All of the Urban Environment Division's building construction, renovation and demolition contract and planning related tendering processes utilised environmental criteria. In addition to the requirements set for a construction contract, the environmental criteria for construction include aspects such as planning and design guidelines and the environmental requirements therein, which are concretised into building plans in the contract procurement phase. The environmental requirements set for construction are discussed in more detail in the 'Construction' chapter of this report.

Progress has been made in the City's monitoring of environmental criteria, but, in addition to commissioning, there are persistent challenges in systematics. The most commonly used environmental criterion was the set of criteria for an environmental management system. In addition to this, the environmental criteria and the reduction of harmful substances were emphasised regarding vehicles and machinery.

Based on the 2022 procurement notifications in the Hilma system, which monitors the objectives of the national procurement strategy, roughly 30 per cent of the procurements of the City's divisions and enterprises promoted low carbon emissions and roughly 8 per cent supported biodiversity.

Emissions from worksite operations and harmful chemicals were reduced with Green Deal agreements

Helsinki has been making progress within the target schedule of the Green Deal in its efforts to mitigate worksite emissions. Some infrastructure contracts have been subject to stricter criteria, such as the use of renewable diesel as fuel, resulting in a roughly 90 per cent reduction in the carbon emissions of worksite fuels. It has been estimated that in 2022, criteria conforming to the Green Deal were used in roughly 75 building and infrastructure construction procurement agreements, i.e. in the majority of projects. In addition to emissions reductions, the agreement aims at the electrification of equipment. Helsinki's worksites have used somewhat

small-scale electric machinery, but there is a lack of experience with using large electric machinery and implementing infrastructure related to its usage.

Procurements in the early childhood education sector involved a systematic introduction of procurement criteria for reducing harmful substances in accordance with the Green Deal, particularly for detergents and sanitation services. Criteria for indoor and outdoor play equipment were completed in 2022, the latter of which will also be included in the planning guidelines for construction projects that involve outdoor play equipment. Helsinki was actively involved in preparing procurement criteria for furniture and mattresses. The aim of this development work is to minimise the amount of harmful substances in daycare environments through procurement processes and thus reduce the total chemical exposure of children.

The development of communication and monitoring playing an important role

The City made efforts towards communicating about responsible procurements by drawing up a communication plan and through a video series entitled Vastuullisten hankintojen teot ('Acts of Responsible Procurements') aiming at concretising responsibility actions. Additionally, the City directed resources diversely towards developing the monitoring of responsibility objectives, e.g. by piloting an electronic monitoring tool and having the Logistics Centre of Stara develop the visibility of responsibly ordered products and order reporting. In its monitoring development work, Helsinki actively monitors national developments, aiming to improve its guidelines and unify practices.

Co-development at the national and international level

Helsinki continued its active participation in national and international network work focusing on responsible procurements. In Finland, Helsinki made contributions to aspects such as cooperation within the metropolitan area and the ecological sustainability theme group of Hankinta-Suomi.

In the field of international cooperation, Helsinki continued its work to promote emission-free worksites and electric machinery in the Big Buyers group of the European Commission. The term of the working group involving roughly fifteen EU member states came to an end, one result of which being that Helsinki signed a declaration of intent to expedite the utilisation of emission-free worksites together with the Cities of Oslo, Copenhagen, Vantaa and Barcelona.

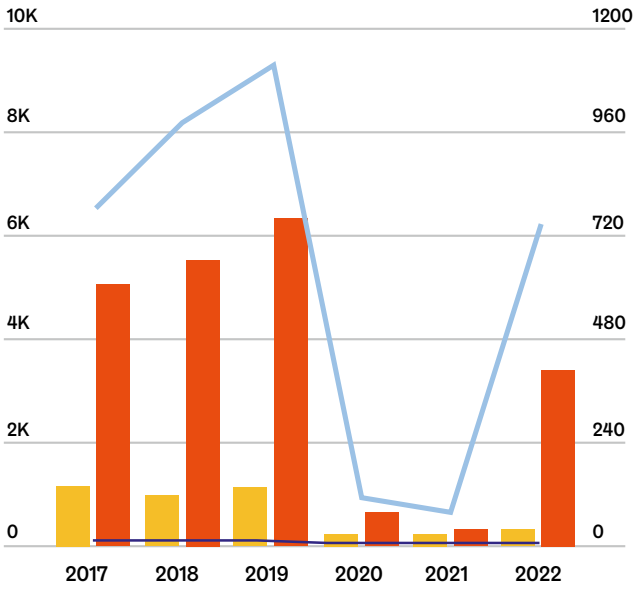
Additionally, Helsinki participated actively in peer learning events and cooperation groups organised by ICLEI. The City is also aiming to increase understanding of conflicts occurring between the reduction of harmful substances, climate change mitigation and the promotion of circular economy in procurements by means of the international ChemClimCircle project.

Responsibility themes taken better into account in various procurements

Obligational environment criteria were approved for the City of Helsinki's vehicle procurements and transport services for 2022–2030. In addition to climate emissions, these criteria reduce emissions affecting air quality and traffic noise in Helsinki's vehicle fleet in accordance with the City Strategy and various environmental programmes. The criteria meet the legal requirements set for clean vehicles. In 2022, Helsinki procured 40 environmentally friendly vehicles, the Rescue Department's procurements included.

Responsibility principles were also set for food procurements, and these principles were included in the City's dynamic procurement system (DPS) for food, which was launched in the autumn. The principles are based on aspects such

City employees' flights



The number of business flights by the City's employees, left scale – Domestic flights

The number of business flights by the City's employees, left scale – International flights

Climate emissions from City employees' business flights, CO_2e in tonnes, right scale – Domestic flights

Climate emissions from City employees' business flights, CO_2e in tonnes, right scale – International flights

as the City's strategic policies and national responsibility recommendations for food procurements. The City's responsibility work also focused on ICT equipment, outdoor advertising equipment and event production services.

The Canemure project for expediting climate-wise procurements published a report on applying the carbon footprint in construction and food procurements and focused on knowledge sharing and education.

The City staff's air travel began to recover from the COVID-19 pandemic. The City's travel instructions state that the carbon neutrality and low-emission perspectives need to be taken into account in all business trips. To complement the travel instructions supporting low-carbon solutions, the City began to prepare an operating model for compensating for flight emissions in order to ensure reliability and additionality.

Eyes on the future

Management of responsible procurements, training and operating models will be made more systematic with the implementation of the procurement strategy. Examples of aspects to be developed in the future include the responsibility of textile procurements, understanding the cross effects of responsibility measures, and protecting biodiversity. Reducing the use of harmful substances in construction and promoting the use of larger electric machinery will also be key measures in taking social and economic responsibility into account better than before. The procurement work will focus increasingly on producing impact and developing monitoring.

Circular economy

Ambitious climate responsibility and nature protection, as well as a responsible economy serving as the basis for sustainable growth, are among the focal points of the Helsinki City Strategy for 2021–2025. Transitioning to circular economy is a key factor in the successful implementation of these focal points. The City of Helsinki is taking part in the preparation process for the national Green Deal for circular economy launched by the Ministry of the Environment in 2022. Helsinki also began updating its Roadmap for Circular and Sharing Economy into an action plan in 2022.

The organisation's circular economy know-how was strengthened in many sectors

Circular economy thinking is still a relatively new approach and requires allocating resources to communication and training. In 2022, the City organised training courses on circular economy for operators such as land use and planning specialists, infrastructure and green construction experts, youth instructors and eco-supporters. The theme of circular economy is also included in the specialist vocational qualification in management provided by the Helsinki Vocational College and Adult Institute. In 2022, one related training event was held for the City's supervisors. The City's internal circular economy network convened twice in 2022. Topics related to circular economy have also been discussed in other networks between divisions.

Bold starts in construction, good practices implemented

Helsinki's circular economy cluster programme has implemented several measures with businesses and other organisations. The programme has produced guidelines for showing the eligibility of reused building parts. In the Vattuniemi pilot, the owners and developers of 16 privately owned properties to be demolished have been supported in setting circular economy objectives, creating circular economy plans and contract documents, and planning pre-demolition. Over the course of 2022, a total of roughly 750 people took part in events held by the cluster.

In 2022, the demolition instructions created for the City's own demolition projects were developed further to support circular economy thinking better than before. The demolition of Laakso Health Station involved piloting requirements that are stricter than the basic level by requiring operators for the first time to collect mineral wools separately and deliver them for recycling. The demolition project took second place in the Vuoden purkuhanke ('Demolition Project of the Year') competition.

Helsinki Vocational College and Adult Institute's Roihupelto campus lifecycle project involved reusing building parts as a minimum requirement. The sand-lime bricks recovered from a building demolished at the site are now awaiting utilisation in the new building.

Helsinki Housing Production Department piloted delivering refrigeration devices for Helsinki Metropolitan Area Reuse Centre to sell in the Heka Kontulankaari 11 renovation project. Roughly 180 refrigeration devices entered circulation, and roughly 100 more will be delivered as the project progresses.

The Urban Environment Division's Facility Service and Helsinki Housing Production Department each named five circular economy pilots in 2022 in which

lifecycle objectives, minimum requirements or quality points to support circular economy were set for the planning or the construction phase. The 'Construction' chapter of this report provides more information on construction.

Restoration of contaminated soil and reuse of materials

Among the most significant contaminated soil restoration projects managed by the City were the Kalasatama–Pasila tramway project and the construction projects of the Crown Bridges Alliance. In addition to these major projects, several individual small sites were inspected and restored in 2022. All in all, soil was restored at roughly 40 different locations.

Former landfill sites in Helsinki are restored pursuant to environmental protection legislation. The Vuosaari landfill site restoration project proceeded largely to the maintenance phase. The City is also preparing to restore the Iso-Huopalahti landfill site in the coming years. Reservations have also been made for the follow-up care of landfills.

In 2022, a total of 216,320 tonnes of contaminated soil was transferred from the City's restoration sites to be processed or disposed of, which is approximately 116 per cent more than in the previous year. The costs generated by the restoration of contaminated areas and landfill sites decreased slightly from the previous year, ending up at roughly 15 million euros.

In 2022, a total of 659,751 tonnes of uncontaminated excavated earth and rock material was used in the construction of public areas. This reuse enabled the City to save 3.6 million euros and 0.6 million litres of fuel and avoid 1,423 tonnes of CO_2 emissions. 160,000 tonnes of unspoiled excavated earth was delivered to external recipients.

In 2021–2022, the City established an operating model for reusing leftover pavement materials from construction sites. In 2022, recycled stone materials were utilised in a total of 15 construction projects. The most commonly used stone types were kerbstones, paving stones and square stones, used on a total area of 7,300 square metres. A total of 7,922 cubic metres of recycled substrates were delivered to reuse sites. The new recycled field on Hernesaari began its operations, and a new recycled field for substrate production is being built in Kivikko. The Konala scenic embankment and the Vuosaari landscaping project are now complete.

Over the course of the year, the Kalasatama–Pasila tramway project managed to recycle all recyclable materials from the project. The recycling rate of materials excavated and demolished at the worksite was nearly 83 per cent.

Efficiency and environmental benefits through service procurements and food waste utilisation

Palvelukeskus Helsinki's framework agreement on work clothes entered into force in 2022. The agreement stipulates that some of the work clothes used by the staff are to be procured as a rental service. Similarly, the Social Services and Health

The contaminated soil transported for treatment or final disposal from the City's restoration sites, as well as the costs incurred by the City from the restoration of contaminated soil and landfills in 2019–2022

	2019	2020	2021	2022
Soil, tonnes	111 000	298 800	100 100	216 320
Costs in euros	25 004 000	24 221 000	15 785 000	15 037 000

Care Division (current Social Services, Health Care and Rescue Services Division) tendered out hospital beds as a service. The objective of service procurements is to promote long-lasting products and make their use and recycling more efficient.

Stadin Safka intensified its utilisation of surplus food in Helsinki by coordinating both collection and distribution operations. By the end of 2022, the number of donors in Stadin Safka's network had grown to more than 60, while the number of food aid operators had increased to 63. Over the course of the year, a total of 925,000 kg of food waste was forwarded from Stadin Safka's terminal, marking a roughly 40 per cent increase from the previous year. The utilisation of food waste resulted in an estimated 1,690-tonne reduction in CO_2emissions. These calculations take transport emissions into account.

Subsidiary companies setting an example in reuse

The relocation of Helsinki Partners' premises in 2022 utilised the company's existing furniture and other movables. Circular economy is also supported through the staff's internal 2nd cycle exchange channel for goods and clothes.

In the autumn of 2022, Helsinki City Theatre launched its Sharing project that involves developing a shared sharing and reuse platform for several organisations. The Helsingin Seniorisäätiö foundation also reuses and distributes supplies between group homes via an electronic platform. In 2022, the foundation introduced the Hävikkimestari application for reducing food waste.

The total amount of materials flowing through Helsinki Metropolitan Area Reuse Centre in 2022 was 6,150,588 kg. Of this amount, 54.7 per cent was forwarded for reuse, 30.3 per cent for material recycling and 15 per cent for utilisation as energy. The company reached its targets regarding increasing reuse and reducing the amount of mixed waste. Helsinki Metropolitan Area Reuse Centre is also involved in the Second Hand Market community of the Redi shopping centre, launched in the autumn of 2022.

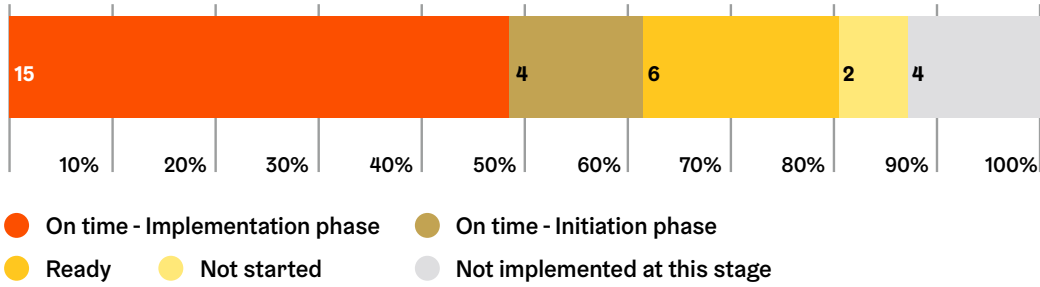
Residents as circular economy operators

The Stara Reuse Centre sells the City's decommissioned vehicles, work and small machinery, manually operated tools and construction materials. In 2022, the number of sales transactions increased by nearly 150 per cent from the previous year. One probable reason for the increase in sales was the renovation of Finlandia Hall; all of Finlandia Hall's old facade marble slabs were auctioned online by Stara via the Kierto.net platform. 1,164 slabs were sold in total.

The City's libraries loan items such as various exercise and outdoor game equipment, tools, and energy and decibel meters. In 2022, the number of items available for borrowing from the City Library decreased by three per cent from the previous year. By contrast, the number of loans increased by more than 50 per cent. The most borrowed items included winter exercise equipment and energy consumption meters. The majority of loans are one-day loans, i.e. game controllers, headphones and laptop computers used at the library. The Library carried out cooperation with operators such as the City's Sports Services with regard to borrowable seasonal exercise equipment and the SATAKOLKYT project with regard to litter pickers. In the autumn of 2022, the Library established a working group for developing and coordinating item loaning.

In the autumn, the City held an event entitled Oodi kiertotaloudelle ('Ode to Circular Economy') for Helsinki residents at Central Library Oodi. The programme featured various repair and customising workshops and a clothes exchange point. Attendees were also given a wide variety of tips for more sustainable lifestyle choices, such as reducing food waste and borrowing and renting items.

Status of the actions included in Helsinki's Roadmap for Circular and Sharing Economy on 27 March 2023



Eyes on the future

Helsinki is a growing city with a high level of construction pressure. However, construction consumes large amounts of natural resources and energy, causing significant environmental impacts. Circular economy in construction is expected to take major leaps forward in the coming years. Pilots and trials will be continued in construction projects with regard to circular economy and used as the basis for creating objectives and planning instructions to support circular economy. Current discussions regarding the impacts of and alternatives for new construction requiring prior demolition must be continued and know-how must be increased. Allocating resources to dismantling building parts intact and reusing them is also necessary for reducing the consumption of virgin natural resources.

Other future areas of development include integrating the principles of circular economy into the City's procurements and promoting reuse of the City's movables. In late 2022, the Social Services and Health Care Division (current Social Services, Health Care and Rescue Services Division) hired a person whose duties include planning and developing reuse of the Division's furnishings. The Education Division is taking part in the ÄLYÄ project coordinated by Haaga-Helia University of Applied Sciences, which involves developing AI-based solutions to support the reuse of furnishings.

Environmental awareness and education

The City of Helsinki's climate and environmental objectives are also heavily featured in early childhood education, schools, and services aimed at young people and adults. According to the City Strategy, Helsinki will also commit to facilitate residents' personal opportunities to make environmentally friendly choices in their everyday lives.

Daycare centres, schools and educational institutions as promoters of environmental awareness

The Education Division continued implementing a sustainable development study path. This study path combines climate and environmental education, futures literacy and design-based learning, enabling learners of all ages to delve into climate change and sustainable development. The study path became reality in 2022 through various models and measures. Through the 'KETTU – Sustainable future in early childhood education and basic education' model, more than 25,000 early childhood education aged children learned about a sustainable future. More than 1,000 early childhood education and care professionals participated in sustainable development training courses. Learning modules focusing on climate change were developed for basic education by utilising the European GreenComp sustainable development competence framework. All of Helsinki's general upper secondary schools implemented an obligatory Carbon-neutral Helsinki course for first-year students. At Helsinki Vocational College and Adult Institute, students' participation in elective sustainable development studies increased significantly from the previous year.

In the spring of 2022, the City of Helsinki Environmental Services carried out environmental education visits for the second-grade pupils of Helsinki schools as part of the Kulkuri – kestävän liikkumisen lähettiläs project focusing on sustainable transport. The Kulkuri visits were a continuation of a 2019 government-subsidised transport guidance project, the goal of which was to increase awareness among children and their families regarding sustainable transport and the environmental impacts of their own transport choices. The environmental education visits of the spring of 2022 reached approximately 570 pupils at eight different schools.

Lessons and materials to support environmental education

Helsinki Region Environmental Services (HSY) provided daycare centres and educational institutions with free-of-charge lessons and materials to support environmental education all year round. The education provided included indoor, outdoor and remote teaching. The lessons were implemented by HSY's cooperation partner Helsinki Metropolitan Area Reuse Centre.

In 2022, a total of 9,050 children and young people in Helsinki attended the environmental education lessons provided

by HSY. A total of 556 hours of lessons were provided. Among children aged 5–6, the most popular lessons were the 'Let's conserve nature!' outdoor play session on circular economy, the 'Running tap water' outdoor adventure and the Rojupöhö puppet theatre show. At educational institutions, the most popular lessons were the 'Recycling hour', the 'Let's conserve nature!' outdoor play session on circular economy, 'Circular Economy ABC' and 'Let's study local water.'

In 2022, HSY's Twin School Programme involved three twin schools from Helsinki in the spring semester and three in the autumn semester. The schools selected to the free-of-charge programme have access to an environmental educator assigned to them, teaching materials and a twin school programme that is adapted to their needs.

Harakka Nature Centre attracted visitors to learn about the archipelago nature

Harakka Nature Centre was opened to the public in early May. During the operating period, Harakka Island had roughly 10,100 visitors. A total of 32 nature study days and 49 environment study days were organised for school pupils. Island adventure trips for daycare children were organised for 77 groups. Swedish-language island adventure trips were piloted in cooperation with Naturskolan Uttern. In total, 3,046 children and young people with their teachers participated in the nature school and island adventures. The Harakka nature house's archipelago nature exhibition was also renewed in 2022.

22 young people attended the Baltic Sea Camp and the archipelago nature camp. A total of 61 people participated in the six environmental education courses held. On Helsinki Day, Harakka Island was used as the venue for an open nature and art event, which was visited by more than 800 people. In 2022, public events and weekend tours organised by Harakka Nature Centre were attended by a total of roughly 2,500 people.

Korkeasaari Zoo inspired children and young people to learn about animals and nature conservation

Korkeasaari Zoo resumed its normal nature school activities after the pandemic years. The majority of the teaching groups – 56 school groups – received teaching on-site at Korkeasaari Zoo. A total of 13 classes participated in remote nature school activities. The theme of a conference for students in lower and general upper secondary schools held in April was the promotion of biodiversity through species protection. In August, Korkeasaari held the Baltic Sea Day for school pupils, which has become a tradition by now and was attended by 484 pupils. The event was held together with the Baltic Sea Action Group, Sealife and Keep the Archipelago Tidy Association. The animal and nature themed summer camps for primary school aged children were so popular that only 26 per cent of all applicants could be admitted. In 2022, Korkeasaari was visited by a total of 13,440 school pupils and 6,439 children in early childhood education in their respective groups.

Korkeasaari piloted the use of XR technology in teaching and environmental education in the form of a game entitled Sademetsän henki ('Spirit of the Rainforest'). The game introduces players to the diversity of rainforests, threats to them and ways to protect them. The game utilises virtual technology and was developed in cooperation with the experts of Korkeasaari, virtual studio Zoan, and the Economic Development Department and the Education Division of the City of Helsinki.

Young people found environmental matters important

In 2022, Helsinki's participatory budgeting survey for young people was taken by 7,043 young people. The participatory budgeting system involves charting young people's opinions on different topics, one of which is the environment. The young people's responses highlighted littering in the environment and animal welfare as key concerns. Consequently, activities popular among young people included art and crafting projects focusing on recycled materials, various volunteer cleaning campaigns and picnics in local nature. Youth Services' nature schools and adventure group activities reached more than 1,500 pupils over the course of the year, while campgrounds had a total of 26,000 reservations.

Youth Services participated in the Power Shift climate event in Nuuksio and cooperated with the SATAKOLKYT project to hold a closing event for the project on Baltic Sea Day in Mustikkamaa. The work of the project will continue as part of Youth Services' everyday operations. An environment-themed seminar was held for the entire Youth Services staff in the autumn of 2022. Among other things, the seminar featured a presentation of the results of the Kestävää tekoa ('Built to Last') youth barometer focusing on the thoughts of young people aged 15–29 on sustainable development and climate matters.

Positive environmental attitudes among Helsinki residents

The Cities of Helsinki, Espoo, Vantaa and Kauniainen conducted a joint survey on their residents' environmental attitudes in the autumn of 2022. The results indicate that more than 70 per cent of the residents of the Helsinki metropolitan area would

prioritise environmental protection over economic growth. The large majority, 74 per cent, believe that they can contribute to combating climate change with their own actions. Nearly two thirds of the respondents reported that they live their everyday life in an environmentally friendly manner as much as they can.

The City of Helsinki drew up an action plan for reducing littering and the amount of litter in the city in 2022–2025. Helsinki residents also participated actively in taking care of the tidiness of the environment. In 2022, residents, residents' associations and schools organised a total of 162 environmental cleaning sessions, in which over 26,500 volunteers participated. Once again, the City's Park Pal activities attracted hundreds of volunteers to pick up litter across Helsinki.

The number of environment-themed books borrowed from libraries' 'eco-shelves' increased from slightly over 500 loans in 2021 to more than 3,000 loans in 2022. The libraries held discussions with authors, writers and activists about climate change and biodiversity loss on a tour entitled Ilmastovieraat ('Climate Guests') from February to May.

Sustainable activities in nature were promoted

Helsinki created a shared nature trip calendar for the municipalities of the metropolitan area with the theme of responsible activities in nature. These guided nature trips for residents were launched in early May. Harakka Island served as the location of a total of twelve theme trips and children's island adventure trips, with 552 visitors participating. The total number of excursions to other destinations held was 21, and they had 743 participants.

The City submitted a forest adventure booklet containing activity tips to all daycare centres, lower stage comprehensive schools and libraries of Helsinki to inspire children to explore nature independently. In order to promote children's knowledge of local nature sites, daycare centres and schools and appropriate schools of natural sciences were provided with copies of the book Lumoava Helsinki – 200 luontoelämystä (Helsinki's green treasures – 200 natural attractions). Helsinki residents were also encouraged to observe nature with the iNaturalist application in a challenge focusing on observing gossamer-winged and Argynnini butterflies. As part of the City of Helsinki's website overhaul, the City conceptualised a theme page for nature sites, and responsible activities in nature was identified as one key subject.

Energy advice for Helsinki residents

In 2022, the topic of energy generated more interest than in previous years. HSY's Ilmastoinfo ('Climate Info') service responded to more than 135 advisory discussions on energy and provided energy advice at several resident events. Late in the year, the animated energy saving tips of Ilmastoinfo were displayed on the screens of shopping centres, the outdoor screen on Helsinki Ice Hall and the screens of HSL's public transport vehicles, among others, where they reached a large number of Helsinki residents. Ilmastoinfo held two housing company energy expert training courses, with 116 participants passing the exam.

Three new courses were produced for the Koutsi.hsy.fi online training platform: one focusing on renewable energy for detached houses, one on the energy-related communications of housing company boards, and one on farming for Helsinki residents. 442 new users signed up on the online training platform. A total of 1,200 people participated in Ilmastoinfo webinars. The webinars focused on the charging of electric cars in housing companies, energy saving in detached houses, and changing the heating method of a detached house and heat pumps.

Environmental risks

As with before, climate change (failure of climate crisis prevention and adaptation measures) was identified as a key risk area in the Helsinki Group's assessment of significant risks in 2022. Due to climate change, various extreme weather phenomena and exceptional situations will increase and create a variety of risks. For example, increased rainfall, floods, heat waves, storm damage and changes in winter conditions pose a significant threat to people, buildings and infrastructure.

Increasing heat waves will cause challenges particularly in health care. The Social Services and Health Care Division (current Social Services, Health Care and Rescue Services Division) mitigates and manages climate risks as part of the division's risk management procedures and environmental work. Actions have been set out in programmes such as the Social Services and Health Care Division's environmental programme for 2021–2023. The Rescue Department's strategy for 2022–2025 states that slowing down and adapting to climate change require immediate action. The Rescue Department is anticipating and preparing for the impacts of climate change and other significant driving forces. The Rescue Department is developing the know-how of its staff in a long-term and systematic manner in order to be able to meet changing customer needs and changes occurring in the operating environment.

The City has a model in place for crisis management. Action cards have been developed for climate risks caused by extreme weather phenomena, containing information such as contact persons and operating instructions in case of disruptions caused by extreme weather phenomena. More information on weather and climate risks is provided in the 'Adapting to climate change' chapter of this report.

There is a significant risk of oil spills in the Baltic Sea due to busy ship traffic. As a result of intersecting maritime traffic, Helsinki is located in the most high-risk place in the Gulf of Finland. The Rescue Department of the City of Helsinki is well-prepared for environmental accidents at sea and in the archipelago, such as oil spills. The Rescue Department's oil spill prevention and response plan for 2021–2025 aims to introduce stability into oil spill preparation and uphold conditions where the Rescue Department remains prepared for all situations where oil spill prevention and response is necessary.

Oil spills in Helsinki in 2019–2022

Oil spills in Helsinki	2019	2020	2021	2022
In waterways	52	25	38	43
In essential groundwater basins	2	11	11	8
In other areas	329	325	316	264
Total	**383**	**361**	**365**	**315**

Environmental economy

Environmental economy includes the income, costs and investments primarily arising from environmental reasons. The information is presented for the parent organisation, meaning the City's divisions, enterprises and departments.

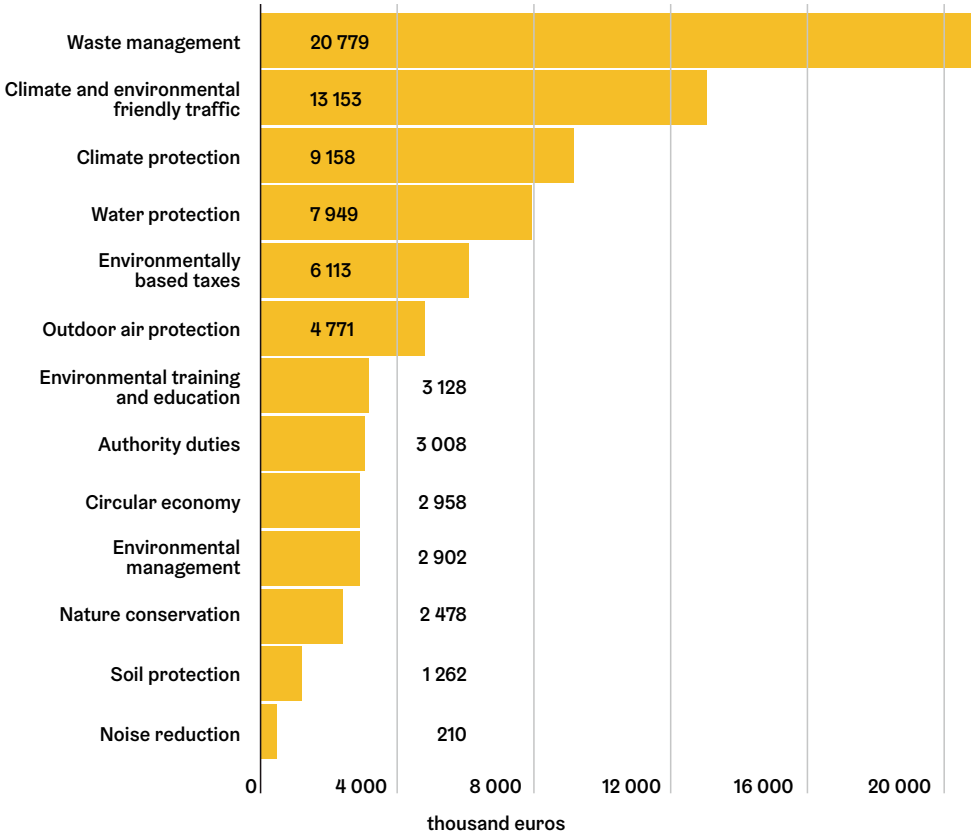
Environmental costs, including depreciations, amounted to a total of 77.9 million euros (-1.4 per cent from 2021). Environmental costs made up 1.5 per cent of all of the City's operating costs, amounting to 117 euros per resident. The City's largest expense items were the costs of areal sanitation and waste management (26.7 per cent), and the promotion of climate and environmentally friendly transport (16.9 per cent).

Environmental investments amounted to a total of 104.0 million euros, which was 14.2 per cent of all of the City's asset investments, amounting to 156 euros per resident. The City's environmental investments decreased by 50.6 per cent from the previous year due to the incorporation of Helsinki City Transport (HKL). Because of the incorporation of HKL, investments such as those of major urban rail projects are no longer listed in the City's investment budget. The greatest investments were related to climate and environmentally friendly transport (69.7 per cent) and the restoration of contaminated soil (13.5 per cent).

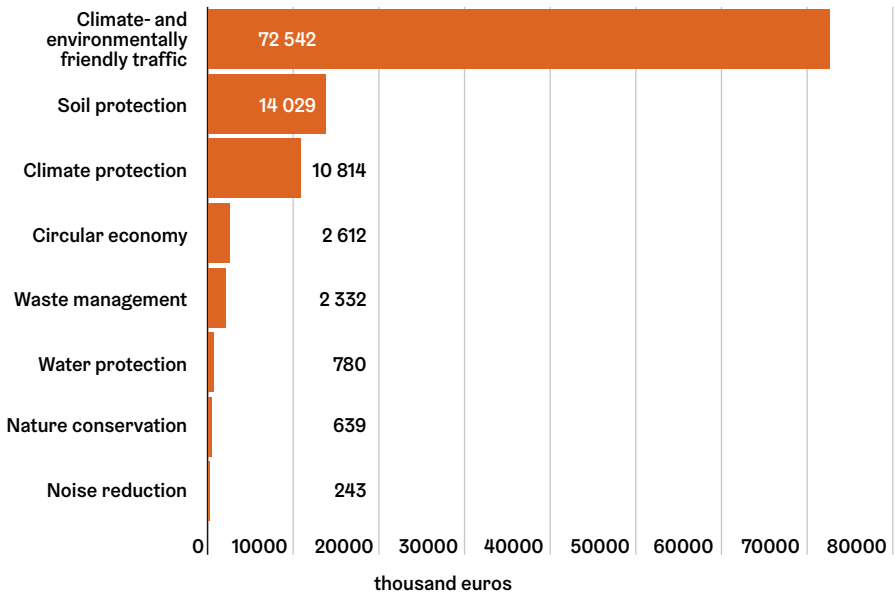
The City's environmental income amounted to 3.9 million euros. The environmental income accounted for 0.3 per cent of the total operating income of the City, amounting to six euros per resident. The City's environmental income also decreased by 30.9 per cent from the previous year due to the incorporation of Helsinki City Transport. The most significant income was generated from vehicle transfer fees in connection with street cleaning (41.2 per cent) and circular economy (16.6 per cent).

The value of environmental liabilities in the financial statements on 31 December 2022 was 23.7 million euros. The liabilities concerned preparing for the restoration of old landfills and decontaminating soil.

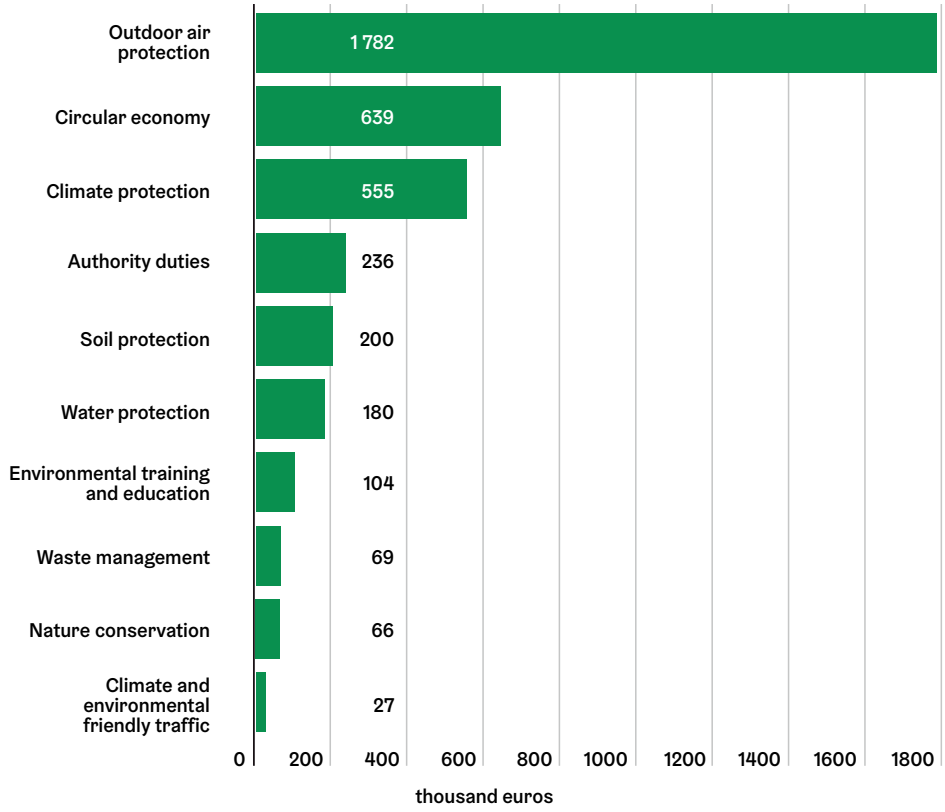
Environmental costs



Environmental investments



Environmental income



Environmental indicators

The tables below show the environmental indicators for monitoring various areas.

Indicators for environmental management and partnerships

Indicator	2021	2022	Definition
Proportion of divisions, public enterprises and subsidiary communities where environmental management is at least at the level of the lighter environmental management systems (proportion of all).	51%	56%	The indicator has improved

Indicators for climate change mitigation

Indicator	2021	2022	Definition
Greenhouse gas emissions in the Helsinki area (kt CO_2e and change compared to 1990)	2,348 kt CO_2e, -33%	2,637 kt CO_2e, -25%	The indicator has deteriorated
Greenhouse gas emissions per capita in the Helsinki area (t CO_2e and change compared to 1990)	3.6 t CO_2e, -50%	4.0 t CO_2e, -44%	The indicator has deteriorated
Energy consumption per capita in the Helsinki area	21,047 kWh	20,645 kWh	The indicator has improved
Energy savings in the City's own operations (public buildings, vehicles, street lights), GWh and savings in proportion to target (KETS 2017–2025)	22.4 GWh, 36% of the target	29.0 GWh, 47% of the target	No changes in the indicator's development
Energy savings of City-owned residential buildings, GWh and savings in proportion to target (VAETS 2017–2025)		28.4 GWh, 51% of the target	No changes in the indicator's development

Indicators for traffic

Indicator	2021	2022	Definition
Proportion of sustainable modes of transport (walking, cycling, public transport, others)	80%	81%	The indicator has improved
Greenhouse gas emissions in Helsinki traffic (kt CO_2e and change compared to 1990)	543 kt CO_2e, -21%	566 kt CO_2e, -18%	The indicator has deteriorated
Proportion of electric and gas cars of the passanger car population	7.5%	10.1%	The indicator has improved

Indicators for air protection

Indicator	2021	2022	Definition
The annual average nitrogen dioxide concentration at the Mannerheimintie measurement station (limit value of 40 µg/m^3, as specified in the EU directive)	17.9 µg/m^3	18.9 µg/m^3	The indicator has deteriorated
The annual average nitrogen dioxide concentration at the Mäkelänkatu measurement station (limit value of 40 µg/m^3, as specified in the EU directive)	20.5 µg/m^3	22.0 µg/m^3	The indicator has deteriorated
Number of days when the limit value level of particulate matter was exceeded at the Mannerheimintie measurement station in Helsinki (EU directive: max. 35 days per year)	14 pcs/a	11 pcs/a	The indicator has improved
Number of days when the limit value level of particulate matter was exceeded at the Mäkelänkatu measurement station in Helsinki (EU directive: max. 35 days per year)	14 pcs/a	19 pcs/a	The indicator has deteriorated
Annual average amount of inhalable particles (PM_{10}) at the Kallio measurement station	10.0 µg/m^3	9.4 µg/m^3	The indicator has improved
Annual average of fine particles ($PM_{2.5}$) at the Kallio measurement station	5.8 µg/m^3	5.1 µg/m^3	The indicator has improved

Indicators for noise abatement

Indicator	2021	2022	Definition
Number of residents exposed to road traffic noise (over 55 dB LAeq7-22) based on the noise survey made every five years	233,020 (2017)	256,541	The indicator has deteriorated
Proportion of completed actions in the noise abatement action plan	37/53	45/53	The indicator has improved

Indicators for procurements

Indicator	2021	2022	Definition
Proportion of environmental criteria of the City of Helsinki acquisitions	51%	52%	The indicator has improved

Indicators for environmental awareness

Indicator	2021	2022	Definition
Number of new eco-supporters who completed basic training (persons/a)	93 persons	53 persons	The indicator has deteriorated
Proportion of environmentally certified Helsinki educational institutions, schools and daycare centres of all	9%	8%	The indicator has deteriorated

Indicators for circular economy

Indicator	2021	2022	Definition
Amount of soil masses utilised (t/a)	1,500,000 t	659,751 t	The indicator has deteriorated
Number of employees who participated in circular economy training (persons/a)	568 persons	202 persons	The indicator has deteriorated

Indicators for water protection

Indicator	2021	2022	Definition
Nitrogen emissions to the sea from Viikinmäki Wastewater Treatment Plant (t/a)	470 t/a	605 t/a	The indicator has deteriorated
Phosphorus emissions to the sea from Viikinmäki Wastewater Treatment Plant (t/a)	18 t/a	22 t/a	The indicator has deteriorated
Proportion of Helsinki's coastal waters in good condition	0%	0%	No changes in the indicator's development
Proportion of Helsinki's groundwater basins in good condition	80%	80%	No changes in the indicator's development

Indicators for nature protection and soil

Indicator	2021	2022	Definition
Share of nature reserves of total land area	3.8%	4.0%	The indicator has improved
Change in the number and area of nature reserves (from previous year)	+5 pcs and +154.3 ha	+4 pcs and +42.1 ha	The indicator has improved
Total land area of water-permeable areas in Helsinki (available every second year)	61% (2020)	64%	The indicator has improved (The result is affected by a change in the method with which the materials used in the calculation are produced, and the change in the percentage cannot therefore be interpreted as the actual change. The 2022 method is more accurate than the 2020 method.)
The area of forests and wooded areas or their relative proportion of all land areas (available every second year)	43% (2020)	42% (2022)	No changes in the indicator's development (Indicator value calculated with a different method than before.)
Change in the number of natural areas (compared to previous year)	(not available)	(not available)	
Change in the number of bumblebee specimens	+70% (from 2019)	-33% (from 2019) -60% (from 2021)	The indicator has deteriorated (It must be noted that annual fluctuations in insect populations are normal, and a distinct trend can only be observed in the long term).
Change in the number of European honeybee specimens	-56% (from 2019)	-87% (from 2019) -68% (from 2021)	The indicator has deteriorated

City of Helsinki Environmental Report 2022

Publisher
City of Helsinki, Urban Environment Division
Photos
City of Helsinki Material Bank

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Layout
KMG Turku
Printed at
Grano Oy

City of Helsinki, publications of the Central Administration 2023:22
ISBN 978-952-386-274-6 (paperback)
ISBN 978-952-386-275-3 (pdf)
ISBN 978-952-386-276-0 (html)
ISSN-L 2242-4504
ISSN 2242-4504 (printed)
ISSN 2323-8135 (online)

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