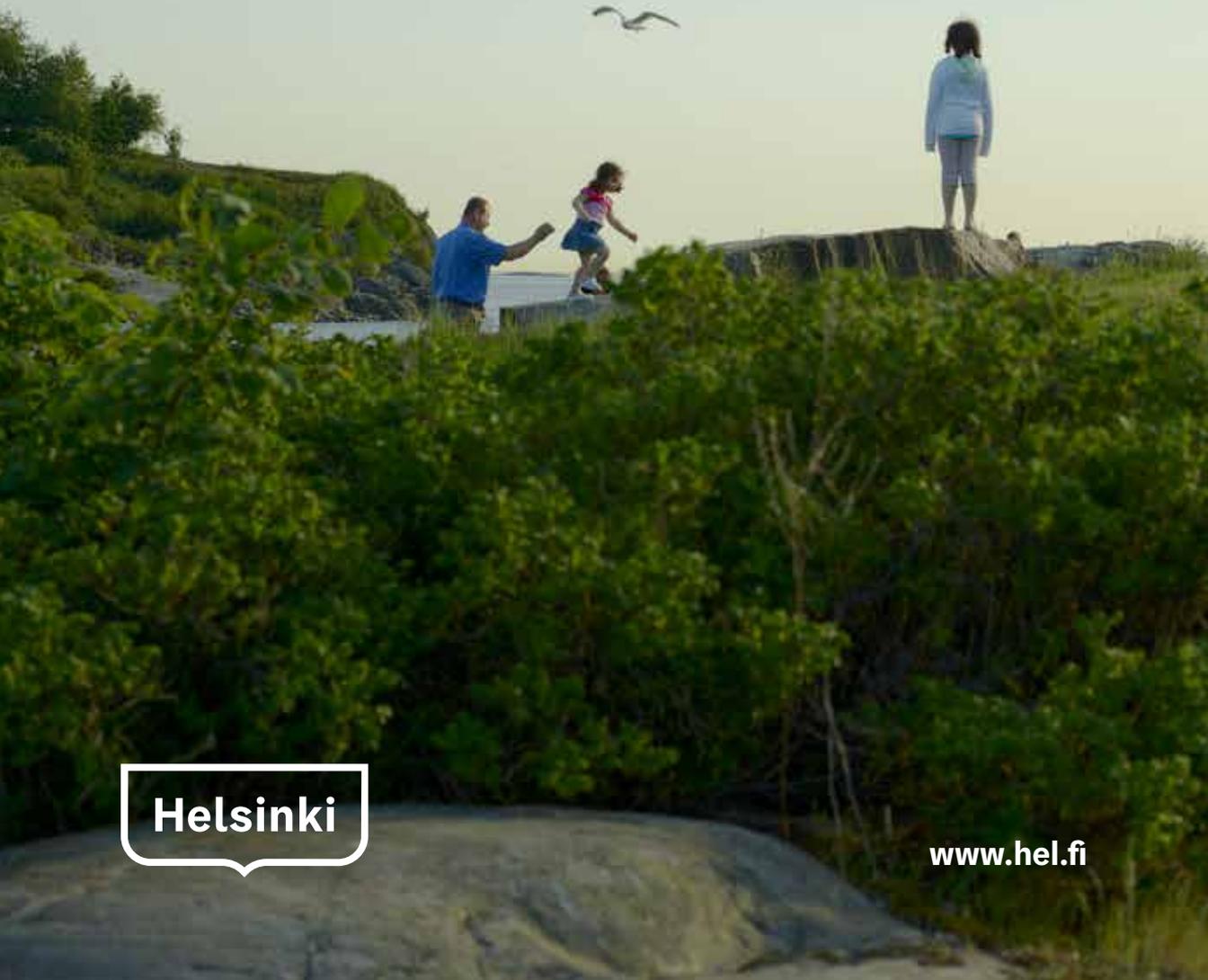


Environmental Report

2018



Helsinki

www.hel.fi

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Address by the Deputy Mayor

Cities all around the world are taking increasingly concrete steps to fight climate change. Helsinki is a part of this fight! We want to do our part and be a pioneer in climate action. Our goal is that Helsinki will be carbon-neutral by 2035.

The most important decision made in 2018 was the preparation of the Carbon-neutral Helsinki 2035 Action Plan, which was unanimously approved by the City Board. The Plan, which includes 147 actions, is wide, ambitious and practical.

The Action Plan shows that we truly possess the means to reduce our emissions and achieve carbon-neutrality. However, the City needs to work hard on implementing the Plan and do things differently across sectors.

I believe that we can learn a lot from international collaboration with other cities. Helsinki was recently accepted into the Carbon Neutral Cities Alliance, the members of which all share the goal of carbon-neutrality.

To gain new perspectives, Helsinki will hold an international challenge competition in autumn 2019, which will be used to seek ways in which to give up coal while using as little bioenergy as possible. I hope that plenty of actors will participate in this competition. The prize will be a million euros. These are one of the greatest challenges of our time. Finding feasible solutions would not only benefit Helsinki, but the whole world.

In addition to ambitious climate actions, Helsinki will continue to invest in nature conservation. As the latest sites, Helsinki has decided to protect the areas of the Kallahti shallows and the Korkeansaarenluoto islet.

The Korkeansaarenluoto islet is the nesting site for the endangered lesser black-backed gull, and some years, it has also been home to the vulnerable goosander and the endangered tufted duck. The Kallahti shallows are the nesting grounds for the endangered tufted duck and eiderduck, as well as the near-threatened red-breasted merganser. These decisions feel all the more significant when the Red List of Finnish Species, which was published this spring, showed how rapidly the endangerment of these bird species has developed.

I am particularly delighted that in 2018, Helsinki's greenhouse gas emissions were at their lowest after 1990. Our emissions have decreased by 27 per cent since 1990, and our emissions per capita have decreased by 45 per cent.

The past year will be remembered for the climate strikes of young people and the significant increase in climate awareness. It is great that we have been able to take concrete steps here in Helsinki and that we are going to the right direction. But we still need to act more quickly.

Anni Sinnemäki

Deputy Mayor for Urban Environment



Environmental key figures 2018

Greenhouse gas emissions have decreased by

27%

2,8
million

trips were made with the city bikes in Helsinki

66%

of the respondents in the safety survey showed concern over climate change

180

The water consumption of Helsinki residents was

liters/day/resident

The Climate
Partners network
already includes

80

large companies
and support
members

The Smart & Clean
foundation has started

7

impactful
change
projects

The young people at Tubecon performed

31 000

#munteko actions that make the world a better place

The residents and
Heka decreased
the calculated
amount of
mixed waste by

860
tonnes

Helsinki has been
a Fairtrade city for

5 years

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 eight 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 2018 Helsinki had a population of 648,042. As of the end of 2018 the population density was 3,032 residents per land area square kilometre. The city of Helsinki's surface area is 715.48 km², of which 213.75 km² (29.9%) is land, 0.86 km² is inland waters, and 500.87 km² sea waters. The majority of the city's green areas are forest (37.2 km²), parks (9.9 km²) and landscape fields or meadows (8.0 km²). There were a total of 434,400 jobs in Helsinki in 2018. Helsinki accounts for 17 per cent of Finland's jobs. The business demographics of the city are similar to other European capitals – strongly service-oriented: the service sector provides approximately 90 per cent of all jobs.

From an environmental perspective the City of Helsinki is amongst the most significant actors. In Helsinki, greenhouse gas emissions resulting from energy consumption and other consumption account for approximately seven per cent of Finland's greenhouse gas emissions. The Viikinmäki wastewater treatment plant cleans the wastewater produced by approximately 800,000 people. Additionally, the City is Finland's largest employer, due to which the City's operations have significant environmental impacts because of the volume of office work, for example.

The Helsinki Group comprises the following communities:

- The City as a parent community (4 divisions, City Executive Office, Audit Department and 5 municipal enterprises)
- subsidiary communities, i.e. organisation which are owned directly by the City (83 subsidiary organisations and 12 foundations)
- associated communities, i.e. companies, foundations and joint municipal authorities in which the City has a 20–50 per cent ownership stake (53 associated companies and 6 joint municipal authorities)

At the end of 2018 the City employed 37,656 people.



Helsinki

Population

648,042

Population density

3,032/km²

Surface area

715.48 km² of which

Land	Water
------	-------

30%	70%
-----	-----

Jobs

434,000

17% of Finland's jobs

Environmental management and partnerships

Environmental matters are a part of the City Strategy, which is complemented by the environmental policy of the City. When monitoring the environmental policy indicators shown in the Environmental Report, we are also partially monitoring the implementation of the City Strategy. The information in the environmental report and statistics is open data. The environmental management in the City organisation is described on the next page.

The EcoCompass environmental management system has proven to be a functioning system in the City's operations. The system is currently in use or being implemented in three divisions or parts of them, two public enterprises and 12 subsidiary communities.

In 2018, the Environmental Youth Work Unit of the City's Youth Services was audited. The EcoCompass certificate applies to the nine offices of the unit. The expansion of the EcoCompass systems from site-specific systems to systems that encompass full service entities and divisions was started in 2018. An EcoCompass is being built for the sports service entity, the Urban Environment Division, the youth services and the Helsinki Biennale 2020.

The City also granted a discount of 30 per cent of the rent charged for area use for operators that had an audited EcoCompass system: the Helsinki Festival's Huvila Festival Tent, the Great Beers – Small Breweries event and the Women's 10 running event.

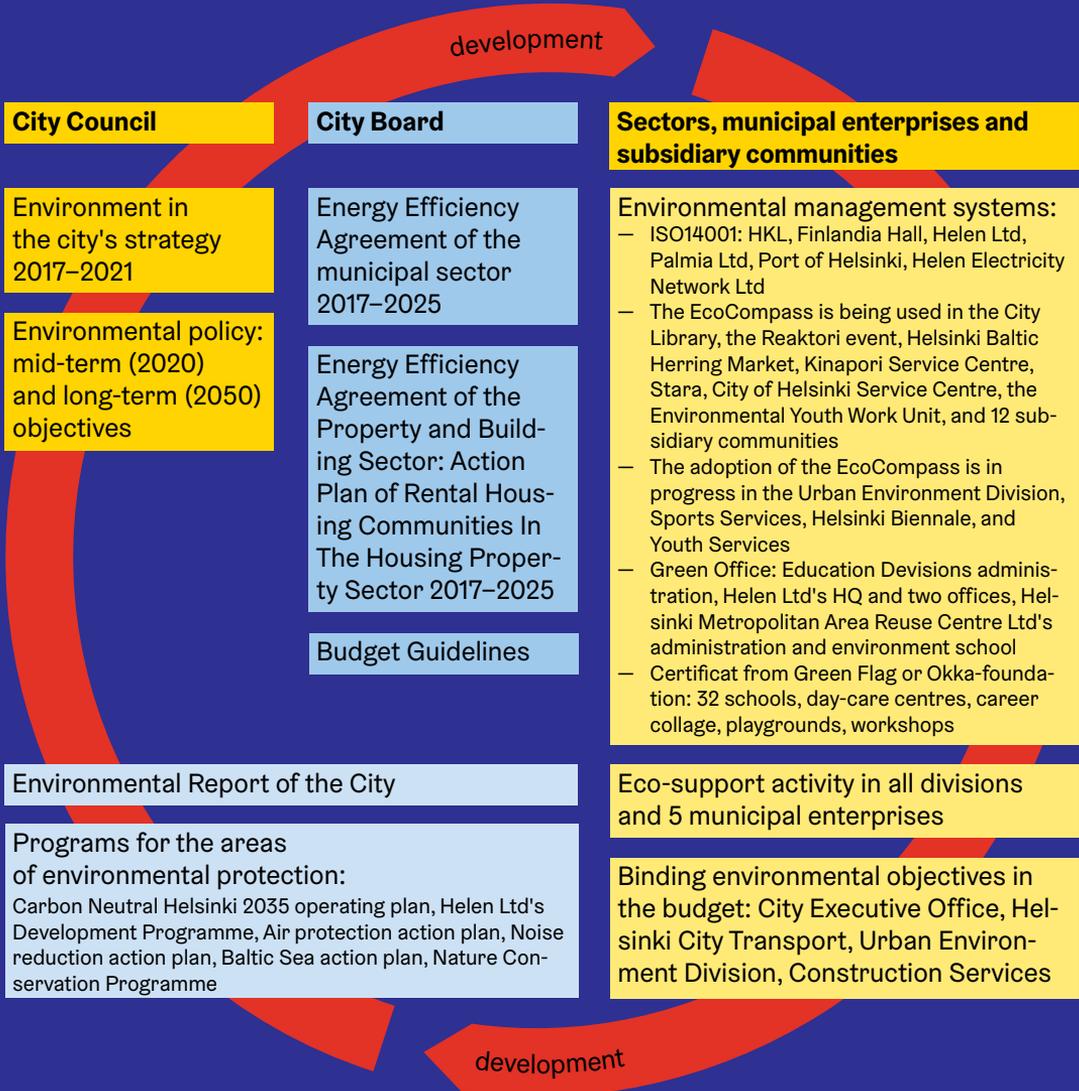
Helsingin kaupungin asunnot Oy, Heka, passed the EcoCompass initial audit. In Heka, environmental work has been organised by using the eco-support operations and the EcoCompass. The operations are coordinated by Heka's own environmental

specialist. The EcoCompass auditor praised the commitment of the management level, in particular – it is the key to success, after all. The environmental programme is ambitious, and, as is typical at Heka, the residents are involved. Heka's environmental work can also be seen in its advanced projects implemented together with partners. In 2018, Heka focused on improving waste management. For example, the collection of plastic packaging was implemented in 80 per cent of Heka's housing locations. The joint efforts of the residents and Heka reduced the calculated amount of mixed waste by 860 tonnes, while the costs of mixed waste were reduced by 250,000 euros compared to 2017.

Aquatics Finland organised the LEN European Junior Championships in the Mäkelänrinne swimming centre in Helsinki and partially in Tampere. The management of this event thought that it was obvious that the event production would be developed to be more sustainable. The event's pursuit of the EcoCompass certificate was also supported by the fact that the venue already possessed the EcoCompass certificate. Aquatics Finland was consistent in communicating environmental matters to the International Swimming Federation FINA and succeeded in convincing FINA of the quality of Finnish tap water, among other things. Because of this, it was possible to offer athletes tap water out of a stylish HSY tap water station.

Pet product shop Murren Murkina received the EcoCompass certificate as the first in its field, and clearly brought up the environment as one of its values, in addition to quality and animal welfare. Murren Murkina has managed to engage both its staff and

Model for City of Helsinki's Environmental Management



The observance of environmental issues in Helsinki is governed by the City Strategy and the environmental policy approved by the City Council, as well as the budget guidelines approved by the City Board. The City also has several programmes for a number of sectors in the field of environmental protection which all direct the environmental management. The environmental work of the divisions, public enterprises, departments and subsidiary communities supports the environmental management of the City. The eco-supporters have a major role in putting the actions into practice.

its customers in developing environmentally smart operations. The staff has plenty of ideas, and they are committed to increasing responsible behaviours.

The EcoCompass has been available throughout Finland since 2018. In the Helsinki Metropolitan Area, HSY is responsible for the EcoCompass work of SMEs and events.

The City's parent organisation had 705 trained eco-supporters and approximately 260 appointed eco-supporters by the end of 2018. Several subsidiary communities also had trained eco-supporters. The operations have spread from Helsinki to 22 municipalities in Finland, the Uusimaa Centre for Economic Development, Transport and the Environment, the Helsinki Region Environmental Services Authority (HSY), the Helsinki-Uusimaa Regional Council and the U.S. Embassy in Finland.

In 2018, the eco-support activities tried a new form of support for developing environmental matters at workplaces: eco-support financial aid. Aid was distributed based on the applications of the eco-supporters for projects such as a food waste campaign, the development of waste sorting, environmental education and taking care of the local nature. The aid is seen as a good form of support, and it will be continued in 2019.

A record number of new partners joined the Climate Partners network of the City of Helsinki and businesses in autumn 2018. The network already includes 80 large companies and support members that mitigate climate change in cooperation with the City. In the autumn, Deputy Mayor Anni Sinnemäki signed environmental commitments with the following new partners: Accenture, Alko, Assemblin, Fiskars, Flow Festival, Haaga-Helia University of Applied Sciences, the Port of Helsinki, the Parish Union of Helsinki, HSL, HSY, Kotipizza Group, Lidl Finland, Meira, OP Group, IBM Finland, Slush, Suomen Messut, Telia Finland, UPM, Urheiluhallit, Valio and WSP Finland.

In the commitments, each new member defines their own climate objectives, the realisation of which is monitored annually. The commitments of the companies joining the Climate Partners network help Helsinki residents eat more sustainably, travel using

low-emission vehicles and participate in carbon-neutral events, among other things. The Climate Partners commit to offer products made of recycled materials and services that consume less energy and are produced by using renewable energy.

At the end of 2018, the City commissioned a safety survey, in which 66 per cent of the respondents expressed concern over climate change. The number of concerned persons has increased significantly, compared to the survey from three years ago. The respondents highlighted global and city-wide concerns more than just concerns related to their own life. Climate change was a shared concern for all respondents, regardless of age. The greatest growth in the number of concerned persons was among the young respondents. This was also seen in the Youth Barometer 2018 held for youth in entire Finland: the concern over climate change has grown rapidly.

In September 2018, Helsinki decided, as the first city in Europe, to commit to reporting the realisation of the Agenda 2030 sustainable development goals to the UN at a city level, following New York's example. Through voluntary realisation reporting, we can make sustainability a concrete driving force behind the City's operations. The first part of the report was published, in connection to the Helsinki City Symposium, in April 2019, and the full report will be published in Helsinki in June 2019 and handed to the UN in July.



Eyes on the future

A significant challenge regarding the environmental management of the City is the uneven distribution of environmental competence and resources within the Helsinki Group. Another challenge is the distribution of goals into the programmes of various environmental protection sectors. The data collection and data systems related to the state of the environment and environmental management should be developed, as open and real-time data would allow for quicker reacting in fluctuating situations.



Smart & Clean

Smart & Clean

The Smart & Clean Foundation continued its work on practical climate solutions implemented jointly by companies and cities. The Foundation started operating in summer 2016, and it has since started seven impactful change projects with the involvement of as many as a hundred companies. New solutions are built, among others, for the areas of air quality, building modernisation, traffic, storm water quality control and circular economy for plastic. The projects have two goals: increasing the carbon handprint on a global scale and reducing the carbon footprint of the Helsinki region and Finland. At the same time, new business opportunities are created for companies, and Helsinki is developed jointly into a place where businesses contribute to the mitigation of climate change and help improve the residents' quality of life.

The proportion of Smart & Clean growth of the Carbon-neutral Helsinki 2035 Action Plan introduces a business perspective into the Plan. The goal is to work together with companies to find permanent ways and methods to use practical climate solutions in Helsinki in a more impactful manner while also increasing the proportion of smart & clean jobs and investments in Helsinki.

The Smart & Clean community now has more than a thousand members. The ecosystems that create climate solutions for cities consists of companies of different sizes, as well as public operators. A concrete example of this is the RenoLeap change project that reforms the modernisation of buildings: the goal of the project is that quality of modernisation increase in Finland, as required by property owners and public discourse. Old buildings are ensured a lifecycle that is as long as possible, in a smart and energy-efficient manner. At the same time, the ecosystem of high-quality and ambitious modernisation is establishing itself in the Helsinki Metropolitan Area and a new kind of company co-operation

is challenging the current standards of the building sector.

Helsinki Metropolitan Air Quality Testbed (HAQT) is another Smart & Clean project that progressed into the implementation stage during 2018. In the project, a dense and accurate air quality measuring system is created for the Helsinki Metropolitan Area. The more accurate information we receive on air quality, the easier it will be to improve it. With the new measuring and modelling methods, air quality can be modelled with an accuracy of 15 metres and forecasts for the development of air quality can be created. With accurate information and forecasts, services such as health services can be developed. Accurate information on air quality also helps direct traffic away from areas where air pollutants accumulate easily.

Smart & Clean also successfully reached the youth in the Helsinki Metropolitan Area in 2018. In the spring, the Foundation organised the #munteko ("my action") campaign where young people were challenged to record actions that make the world a better place. The Foundation purchased five videos made by young people to use them to communicate the importance of the actions taken by residents, cities and companies in climate change mitigation and the promotion of circular economy. In the autumn, the message of Smart & Clean was seen at the Tubecon event for youtubers, where the Smart & Clean TubeCity Challenge game was included in the Tubecon app. The game guided the youth participating in the event to perform various actions that mitigate climate change. The app was the most-downloaded entertainment app in the App Store during the Tubecon weekend, and more than 31,000 #munteko actions were taken at Tubecon.

Climate protection

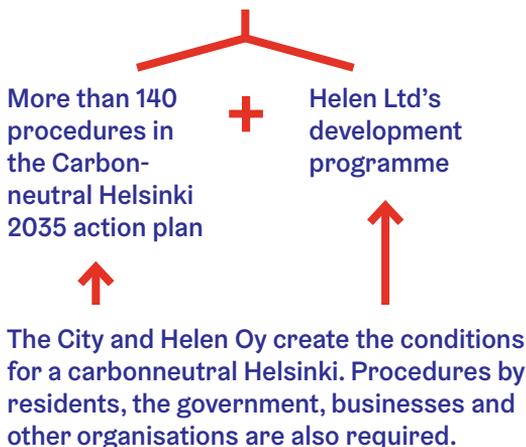
According to the City Strategy 2017–2021, Helsinki will be carbon-neutral by 2035, and emissions will be reduced by 60 per cent by 2030. The Carbon-neutral Helsinki 2035 Action Plan was prepared during late 2018, and it was unanimously approved by the City Board in December. A vast number of persons from both the City organisation and interest groups participated in the preparation of the plan. In addition, external consulting firms were used to make the emission and cost effect calculations for traffic, construction and buildings. Statements were also requested from the firms, and VTT conducted an assessment of the actions' impact on business. Based on these studies, new actions were added to the Action Plan and existing actions were modified. According to the wishes of businesses, a business forum was founded to monitor the implementation of the Action Plan.

The Action Plan presents the current climate actions of Helsinki, as well as the forecasts for 2030 and 2035. The sectors in the Action Plan are the following:

- Traffic
- Construction and use of buildings
- Consumption, procurements, sharing economy and circular economy
- Smart & Clean growth
- Helen's development programme
- Carbon sinks and compensation for emissions
- Communications and engagement
- Coordination, monitoring and assessment of climate work

In the Carbon-neutral Helsinki 2035 Action Plan, 147 actions are recorded, along with the responsible organisations and schedules. To see how Helsinki is progressing in its climate goals and the implementation of the Action Plan, we need monitoring. Implementation and monitoring of the Action Plan are defined according to the policy of open decision-making. The open decision-making policy is a method developed by the National Institute for Health

Carbon-neutral Helsinki 2035



Structure of the Carbon-neutral Helsinki Action Plan.

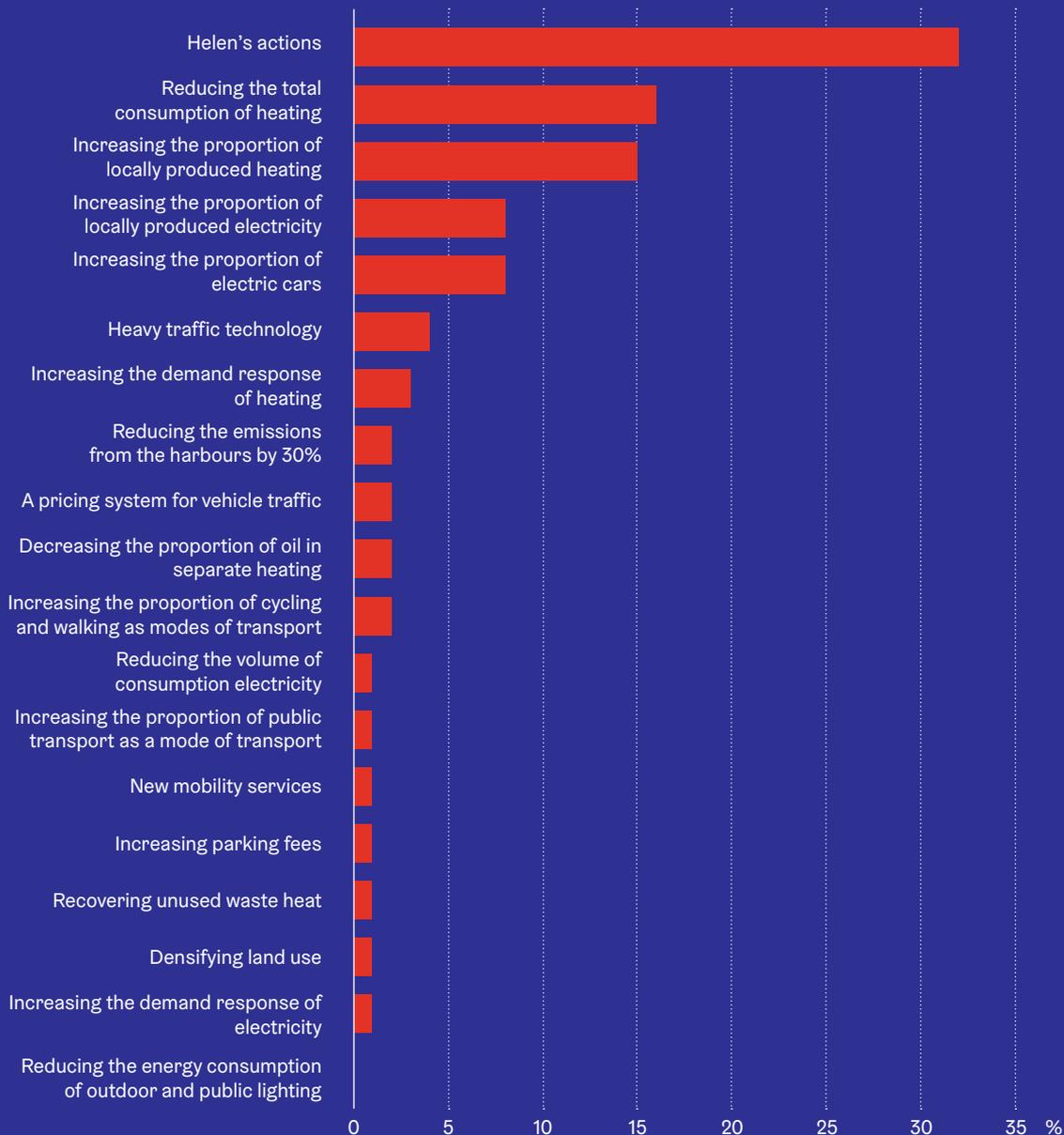
and Welfare. The purpose of the policy is to help make public decision-making processes more open and transparent. The open decision-making policy involves engagement and openness of data: as many people as possible get to participate in the operations, and the same information will be available to them throughout the process, from preparation to decision-making. This way, it can be ensured that the best expertise is being used and the participants are more engaged in the operations. The open decision-making policy ties the strategic goals of Helsinki together in terms of openness, engagement and using digital solutions.

The open decision-making policy was tested during the preparation of the Action Plan. All materials were available at the stadinilmasto.fi website, and the Plan was co-written on an open web document.

A freely available online monitoring tool has been developed for the monitoring of the Action Plan. With the tool, all interested parties can monitor the progress of the actions. Each action will have its own page on the monitoring tool, which will include information on the progress and potential impact of the action. Different parties can add different informa-

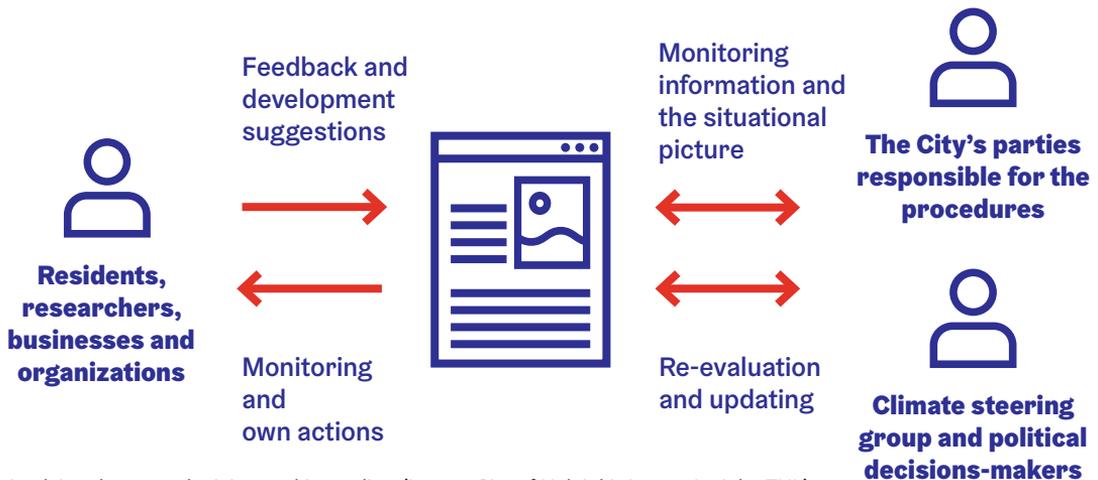
Emissions reductions

Distribution of emissions reductions in the Carbon-neutral Helsinki Action Plan. For construction and use of buildings, the calculations use the current emission factor.



Source:
Traffic model studies by WSP Finland Ltd 2018, and studies on construction and use of buildings by Gaia Consulting Ltd 2018

Carbon-neutral Helsinki 2035 monitoring tool



Applying the open decision-making policy. (Image: City of Helsinki, Avanto Insight, THL)

tion to the monitoring tool. City employees report on the progress of the actions. In the future, the goal is to receive the majority of data directly from other databases. Thanks to open data, researchers can assess the impact of the various actions, as well as the assumptions and calculations behind the actions. Feedback is collected from residents regarding their opinions on the actions and their desired forms of participation. Open monitoring has also attracted the attention of many companies. Political decision-makers can use the monitoring tool when assessing if emissions are decreasing in the manner agreed on, or if the operations should be directed more effectively. As the actions progress further, the assessments on the different impacts will become more accurate, and the justifications for them will be openly available.

In 2018, a demo version of the monitoring tool was finished. The tool will be developed further in 2019. The project has received funding from the EU's Climate-KIC programme, and it also involves Avanto Insight, the National Institute for Health and Welfare, Byfar Studio and Solid Boot, in addition to the Environmental Services. An impact assessment of the actions will also be connected to the monitoring tool. The assessment will be developed in the KILTOVA project together with the Six City Strategy participants, the Finnish Environment Insti-

tute and the Ministry of the Environment. The monitoring tool has open source code, and it will be freely accessible to other interested parties (the demo version (in Finnish) is available at: hnh.hel.ninja).

When the City Board approved the Carbon-neutral Helsinki 2035 Action Plan in December 2018, it also decided to join the reformed Covenant of Mayors for Climate & Energy in the EU. The Covenant was also expanded to include the adaptation actions related to climate change. The reformed Covenant requires that the participating cities reduce their greenhouse gas emissions by 40 per cent from the level of 1990, at the minimum, by 2030, that they assess climate risks and that they prepare an adaptation plan. Helsinki's new climate goal exceeds the level required by the Covenant.

The climate network of the City of Helsinki employees has approximately 170 members. The climate network was involved in the preparation of the Carbon-neutral Helsinki 2035 Action Plan, and it is also helping in the implementation and monitoring of the Plan. The members of the climate network thought that it was extremely important to develop the monitoring of the Action Plan, and they also participated in the innovation phase of the monitoring tool, as well as the identifying of the indicators for monitoring. Based on the ideas of the climate network, the preparation of an action plan for Carbon-neutral Helsinki

Zoo was also started. In summer 2018, the climate network visited the carbon-neutral island of Harakka.

In the Carbon-neutral Helsinki 2035 Action Plan, energy renaissance, meaning the energy renovations of the old building stock, has been highlighted as one of the most important actions. The intention is to improve the energy efficiency of the entire building stock in the urban area by 20 per cent by 2035. The preparation of the Energy Renaissance Programme started with a background study where previous projects and reports on the topic were analysed, suitable benchmarks were sought and 20 interviews with experts were conducted. During autumn 2018 and winter-spring 2019, three workshops were organised for experts from interest groups and housing companies' decision-makers. The energy renaissance programme is intended to be ready during 2019.

In the MySMARTLife project, smart heating control pilots continued. In Merihaka, Haapaniemenkatu 12, smart thermostats were installed in all apartments, with which the residents can control the heating according to needs. An extensive energy efficiency survey was made on two housing companies in the area, and the possibilities of local energy production were studied. In the Viikki Environment House, the smart heating control pilot continued, and approximately 10 per cent of energy was conserved during the first heating season. The optimisation of the smart control of electricity storage was also continued. The use of the property's cooling wells for heating production was advanced in co-operation with Helen.

Helen installed five solar panel benches in the Kalasatama and the Market Square areas, which can be used to charge an electric bike or a mobile device. In addition, a charging station for electric bikes, using power from solar panels and the electricity storage, was installed in the Market Square, near the Allas Sea Pool. In project cooperation, shared charging infrastructure was built in Hakaniemi for electric buses, working machines, transport vehicles and collection vehicles. More information on the robotic bus pilot of the project is available

in the Traffic chapter of this report.

In February 2018, the Energy and Climate Atlas was published as a 3D information model. It includes extensive energy information on buildings. Among other things, the atlas contains information on the energy conservation potential of buildings, solar electricity and energy, heat leaks and geothermal energy, heating types, finished renovations and energy performance certificates, as well as the consumption of electricity, district heating and water in the rental apartment buildings of the housing company Helsingin kaupungin asunnot Oy. The atlas is a tool for decision-making in housing companies and municipalities, for instance, as well as other operators in the property and construction fields. HSY also published the kattohukka.fi service that illustrates the heat leaking through Helsinki roofs. The development of the Carbon Neutral Me app also started. The purpose of the app is to provide personalised information on the carbon footprint of the user and motivate users to pursue a low-carbon lifestyle.

The mySMARTLife project, funded by the European Commission, is part of the Horizon 2020 programme. The operations are aimed at enhancing the energy efficiency and comfort of living in the existing and new building stocks, increasing the percentage of renewable energy production, developing the City of Helsinki energy grid and electricity storage for renewable energy, as well as upgrading electric transport and electric public transport.

The cross-sectional theme is the integration of open data and smart information and communication technology in the operations. The goal in the target areas is to reduce energy consumption by 10–20 per cent. The project is carried out by the City of Helsinki (in cooperation with HSY), Helen, Forum Virium Helsinki, Metropolia University of Applied Sciences and the VTT Technical Research Centre of Finland, as well as the SMEs Fourdeg and Salusfin. Our Lighthouse City partners are Nantes and Hamburg, and the Follower Cities are Bydgoszcz, Palencia and Rijeka. The operations in Helsinki and the project cooperation were presented in several international



events in Finland and elsewhere in Europe.

In the Climate-smart Housing Companies project, solutions are sought to improve the energy efficiency of apartment buildings using digital services and solutions based on housing company data. The purpose is to support the increase in demand for digital cleantech solutions for apartment buildings, offer an innovation environment to create solutions and develop common operating models and platforms related to the collection, ownership and sharing of apartment building data.

During winter and spring 2019, the six housing companies participating in the project will receive sensors that measure temperature, air humidity and carbon dioxide levels. Energy surveys on these housing companies will also be conducted. A datahub for the data collected by the sensors will be developed. It will be the foundation of the services developed for residents and housing companies.

The actual product of the project is the digital guide for housing companies, to be published in 2020, which will include a compilation of things learned during the project.

The Climate-smart Housing Companies project is a part of 6Aika, the Six City Strategy. The project started in September 2018, and it will continue until the end of 2020. In addition to the City of Helsinki (the main implementer), the project is implemented by the City of Vantaa, HSY, Forum Virium Helsinki and the Green Building Council Finland.

For a long time, the City has demanded that the recipients of the apartment building plots conveyed by the City adhere to stricter energy efficiency requirements than what is commonly required by the law. In practice, this has meant a stricter E value requirement. In 2018, following the update to the decree of the Ministry of the Environment, the energy efficiency requirement for apartment building plots conveyed by the City was updated so that the E value of the building must be below $80 \text{ kWh}_E/(\text{m}^2/\text{year})$ (in the decree: a maximum of $90 \text{ kWh}_E/(\text{m}^2/\text{year})$). In the City regulations valid in 2017, the E value had to be below $120 \text{ kWh}_E/(\text{m}^2/\text{year})$ (in the decree: a maximum of $130 \text{ kWh}_E/(\text{m}^2/\text{year})$).

The electric permit processing of the

Building Control Services applies to all permit-based projects, construction site phases and archiving (www.lupapiste.fi). Customers were encouraged towards energy-efficient construction by offering them a possibility of a 30 per cent discount on the building permit fee on the 2018 building control price list, if the building is designed to be low-energy. The criterion was made slightly stricter, and in 2018, the low-energy discount of the permit fee was granted to six housing projects with a total of 13 buildings.

Green roofs have been designed for a dozen premise projects, one of which progressed into the implementation stage in 2018. Almost 50 per cent of the premise construction and expansion projects will have a partial or full green roof.

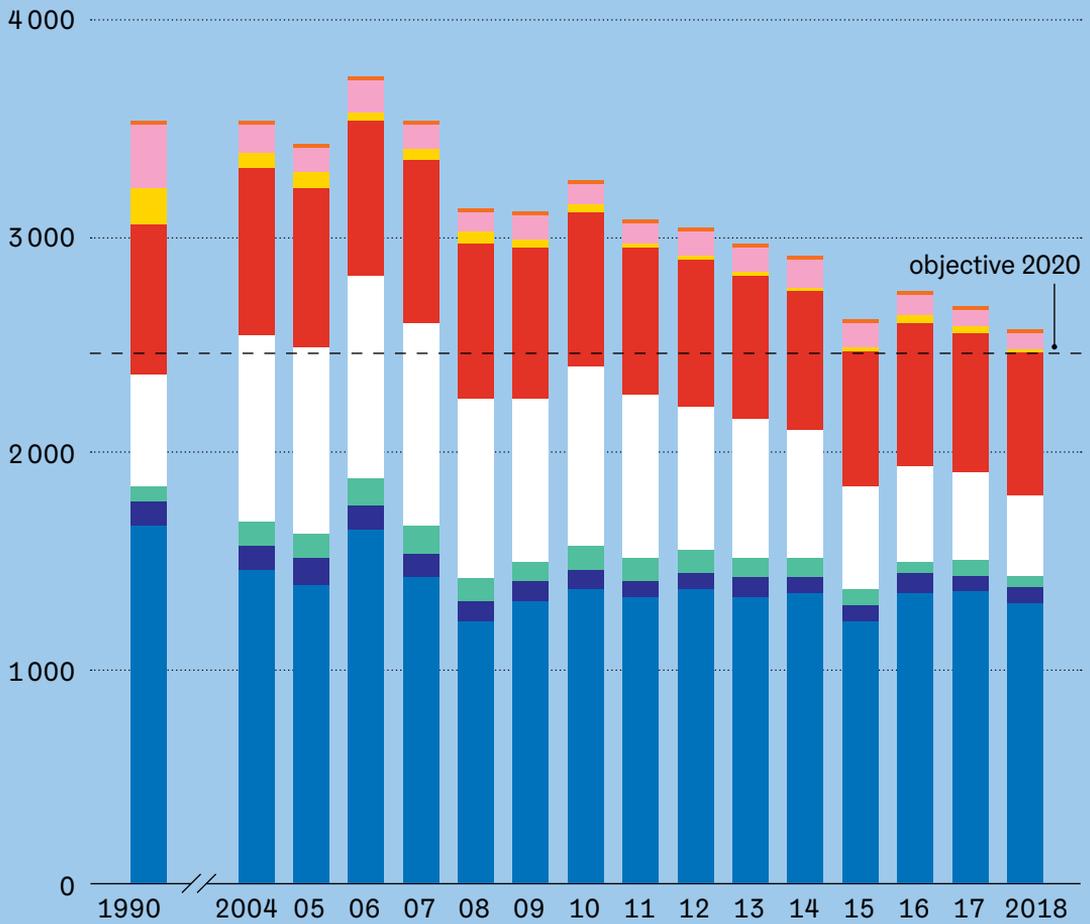
Stara's machinery and vehicles will move on to biofuels. The emissions reductions are already significant even though only a portion of the vehicles has been using biofuels since 2017. By the end of April 2018, the machinery had produced 1,160 tonnes less carbon dioxide than earlier, and harmful local emissions had also decreased significantly. The Board of Stara decided in May 2018 that the primary fuel for all diesel vehicles of the City will be renewable diesel made entirely of waste and leftover food. The Bio Sata project of the Smart & Clean Foundation is behind the transition to biofuels.

The Transport Service reduced both its mileage and its carbon dioxide emissions by transporting people travelling to the same destination by using the same car. The combination of trips helped save more than 430,000 kilometres. The remote care service of the phone and welfare services also reduces the mileage of home care services, since remote care uses video and audio connections to meet customers. In 2018, remote care helped save 1.32 million kilometres, which is 200,000 kilometres more than in 2017.

In 2018, the total greenhouse gas emissions of Helsinki residents, services and industry amounted to 2,559,000 t CO₂e (-4% from 2017), which is the lowest level in the documented history of Helsinki. The reduction in emissions can primarily be explained with district heating and electricity production

Greenhouse Gas Emissions

1,000 t CO₂e



becoming cleaner. The emissions of district heating produced by Helen were reduced since the proportion of coal decreased while the proportion of cleaner natural gas increased. The use of heat pumps and bioenergy also increased in the production of district heating. Nationally, electricity production became even cleaner and the emissions from electricity were reduced significantly (–9%). The total emissions of Helsinki were 27 per cent lower than in 1990. Emissions per capita decreased below 4 tonnes (3.96 t per capita) for the first time ever, and they were 45 per cent lower than in 1990.

Renewable energy accounted for 12 per cent of the energy produced by Helen in 2018. Energy was produced with hydropower, wood pellets, wind power, solar power and biogas, as well as with heat pumps by using various surplus energy flows.

Apart from traffic (+1%), the emissions of all sectors decreased. The emissions of passenger car traffic decreased (–1%), while the emissions of heavy freight traffic (lorries) increased (+5%) due to traffic volumes growing. Helsinki is surveying potential measures,

such as the expansion of the environmental zone, that could reduce the emissions of heavy traffic (air quality and CO₂).

In 2018, the total electricity consumption in the Helsinki urban area amounted to 4,348 GWh (1% lower than in 2017), the consumption of district heating amounted to 6,700 GWh (1% higher than in 2017, due to things such as the growth of the building stock), and the consumption of district cooling amounted to 187 GWh (33% higher than in 2017). The total energy consumption in the urban area, the energy consumption of traffic and industry included, remained the same, at approximately 13,800 GWh. However, the total energy consumption per capita decreased by one per cent from 2017. In 2005–2018, the total energy consumption per capita has decreased by 16 per cent.

In 2018, the temperature of Earth was the fourth-warmest in documented history (source: NOAA). Only 2015, 2016 and 2017 were warmer. In Kaisaniemi, Helsinki, the annual average temperature was at 7.2 degrees, which is 1.4 degrees higher than the temperatures in the comparison period of 1981–2010.



Eyes on the future

The City's total greenhouse gas emissions reduction target for 2020 is 30 per cent. The goal can be reached, but this depends on the fuel distribution in the production of district heating, in particular, as well as the proportion of renewable fuels used in public transport in 2020. In the Bio Sata project of the Smart & Clean Foundation, HSL and Stara seek to raise the proportion of biofuel to 100 per cent by 2020 by using biofuels made of waste and leftover food. The production and consumption of electricity are also significant as improved energy efficiency and Finland's electricity production becoming cleaner (increased wind power production and the completion of the Olkiluoto 3 nuclear plant) contribute to the emissions reduction goal, for their part. Helen's goal is to have 25 per cent of energy come from renewable energy in 2025, and for the same year, Helen also seeks 40 per cent of emissions reductions in its energy production. The Hanasaari coal plant will be shut down by 2024, and Helen will replace its production with CO₂-free alternatives.

The reduction of 20 per cent in energy consumption per capita sought by the City for 2020 can be achieved through effective energy efficiency actions. The Energy Renaissance Programme prepared by the City for the private building stock has a central role in this; the goal of the programme is to accelerate the energy efficiency actions of properties. The City itself will also accelerate the improvement of the energy efficiency in City-owned buildings (service premises and rental apartments) in accordance with the Carbon-neutral Helsinki 2035 Action Plan.

Adaptation

The aim of controlling climate change is to limit the rise in the average global temperature to 1.5–2 degrees. However, the current emissions development seems to be leading closer towards a four-degree rise by the end of the century. In Helsinki, this means a rise of over six degrees. Adjusting to climate change refers to the means of reducing the detrimental effects of climate change and utilising the benefits.

According to the City Strategy, "Helsinki is a functioning, safe and comfortable city". Part of the safety is preparedness for the effects of climate change. In March 2018, a climate risk evaluation report was completed in cooperation with the Finnish Meteorological Institute, based on which the largest risks are storm water floods caused by heavy rain, inland floods, slipperiness, extreme and abnormal winter conditions, symptoms caused by prolonged darkness, heat waves, drought and the eutrophication of the Baltic Sea. This estimate also corresponds to the requirements of the Covenant of Mayors for Climate and Energy.

In 2017, the policies on adjusting to climate change were completed, and they will be used to prepare for the already ongoing climate change. The policies were updated in autumn 2018. In the update, the status of the actions, the changed City organisation, the new Strategy, the results of the City's climate risk assessment and the most recent information on climate change were taken into account. The adaptation policies will be processed by the City Board in spring 2019.

The policies 2019–2025 are a plan to help Helsinki adjust to climate change. The adjustment vision presents what a climate-proof Helsinki will look like in 2050. To make the adjustment vision possible to achieve, actions are needed now. These actions are addressed with four themes. These themes are preparedness, integration, development, and overall economy and business opportunities. Every theme includes central operations or

priorities to be focused on during the next two City Council terms. The adjustment policies have been formed for the needs of the City's planning and for preparing the City's strategic objectives. The proposed measures are included in the City's planning and guidance, for example in city planning, adjustment and preparedness planning, the

To make the adjustment vision possible to achieve, actions are needed now.

Storm Water Control Programme, the Flood Strategy, as well as the programmes for green area development and nature conservation and management.

In 2018, a work group for climate change adaptation was founded in the Social Services and Health Care Division. The group includes representatives from the service entities and support services of this Division, the Urban Environment Division and Heka. The work began by identifying the most important effects of climate change from the Division's perspective. Preparing for heatwaves was selected as the first development area. In 2018, long heatwaves caused problems particularly in the 24-hour care homes, where the mobility of residents or patients is restricted, and in pharmacy rooms where medication needs to be stored at specific temperatures. Heat also disturbed the work of people using heavy protective gear.

The City's Storm Water Strategy was updated in 2017, in cooperation with HSY, into the integrated City of Helsinki Storm Water Programme. The City Board approved the Storm Water Programme in May 2018. Storm water is the rain and melted water in constructed areas that is led away from the ground, roofs of buildings or other such surfaces. The Storm Water Programme promotes systematic and sustainable overall

storm water management in Helsinki in the long term and also helps prepare for the future by taking the impacts of climate change, the denser structure of the City and the changing legislation into account. The goals of the Storm Water Programme include using storm water to make the environment more pleasant and maintain natural diversity and good state of the surface and ground waters; ensuring local and regional drying while taking climate change into account; preventing and removing the harm caused by storm water; controlling storm water flows; improving the quality of storm water; reducing the volume of storm water in the mixed sewer system; adopting co-operation and operation models that support systematic overall storm water management; ensuring sufficient competences and resources. A storm water work group was appointed to monitor the Storm Water Programme. The group consists of the storm water coordinators appointed by the City services and HSY, and it coordinates storm water management and develops co-operation and operation models. It also shares information about the Storm Water Programme and the goals thereof, as well as organises necessary training. The storm water work group co-operates with similar work groups in Espoo and Vantaa.

iWater – the Integrated Storm Water Management project (2015–2018) produced methods and solutions for controlling storm water to help in city planning. The project updated the Helsinki green factor tool used for ensuring that sufficient green surface

area is conserved when building new plots and for preventing floods caused by storm water. The project was also involved when the Helsinki Storm Water Strategy was updated into an integrated Storm Water Programme. Construction drawings were made for the storm water filtration container located by Taivallahti. The filtration container will remove microplastics and other hazardous substances from the storm water on the streets. The construction of the container was started by the Smart & Clean solution project for controlling storm water in 2018. The filtration container is a structure submerged into ground, which contains various filtering materials, such as biochar and sand. Together with the University of Helsinki and Aalto University, the project is used for ground-breaking research on harmful substances contained by storm water and how filtration containers can be used to reduce these substances.

In 2018, a condition on storm water was included in the plot conveyance conditions for housing plots, according to which the planning and implementation of the plots need to ensure sufficient storm water management while taking the impacts of climate change into account. The harms caused by storm water must be prevented as climate conditions change and city structures become denser. The planning of storm water management must follow the goals and prioritisation of the City's Storm Water Programme to control and improve the quality of storm water flows.



Eyes on the future

The perspective of adapting to climate change must be a part of all planning in the City, and the City must be built to meet the needs posed by the changing climate, even now. By preserving and building green infrastructure and avoiding the closing of the soil surface, the management of storm water can be improved, the strengthening of the heat island phenomenon can be prevented, the diversity of the environment can be increased and impurities ending up in water bodies can be prevented. The skills of employees need to be improved as well.

Energy-efficiency in the City organisation

The energy efficiency agreements (KETS) made between the municipalities and the Ministry of Economic Affairs and Employment are used to implement the actions required by the national energy and climate strategy. The instructional energy conservation goal in the municipal energy efficiency agreement of the City of Helsinki for 2017–2025 is a minimum of 7.5 per cent from the level of 2015.

The production and consumption of energy have significant roles when working towards emissions reductions. Of all CO₂ emission of the City, heating amounts to 57 per

The emissions reduction work of the City of Helsinki is coordinated by the energy conservation work group, which started operating in autumn 2018.

cent and electricity consumption amounts to 16 per cent. The emissions of the Helsinki Group amount to 15 per cent of the emissions of the entire city. Of this percentage, 95 per cent is caused by the energy consumption of buildings.

The emissions reduction work of the City of Helsinki is coordinated by the energy conservation work group, which started operating in autumn 2018. Their operations continue the work of the advisory board for energy conservation, which operated in 1974–2017. The work group has 24 members from all divisions and Helen, Palmia, Stara, the Port, Heka, HKL and HSY. The goal of the group is to promote the energy conservation operations of the City and activate both the divisions and the Helsinki Group to conserve energy.

The Energy Efficiency Directive requires that, starting in 2018, all public buildings must be constructed as near zero-energy buildings. The energy planning instructions for public service buildings, aiming close to zero energy, have been integrated into the City's general HVAC design instructions for service buildings.

In the City's own premises projects, the goal is to reach energy efficiency levels that exceed the national requirements and to construct buildings that support the ambitious emissions reduction goals, without compromising the health and safety matters related to the premises. The target E values set by the City of Helsinki for its own construction projects are 10 per cent lower than the limits set by the Ministry of the Environment. The primary goal is that 5–10 per cent of the energy demand be replaced with renewable energy. For now, Helsinki's target values are used in the modernisation of buildings, when applicable. We aim to make the goals even more ambitious in the coming years.

In the built property management of the City, a premise lifecycle steering model regarding matters related to energy, the environment and lifecycles has been developed. The model will combine the instructions and requirements of the City and the State and help set and monitor project-specific energy and environment goals throughout the construction project. Goal-setting aims to influence the building's entire lifecycle impact on matters related to energy and environment, such as carbon dioxide emissions, conservation of nature values, sustainability and longevity. The pilot for the steering model will start in 2019 with a few premise projects.

In Helsinki, the most significant sources of CO₂ emissions are energy production and traffic. The premises owned by the City rarely

Energy consumption and CO₂ emissions of the City of Helsinki in 2018 and 2017

	2018		2017		Change % 2017–18	
	GWh	CO ₂ , kilotonnes	GWh	CO ₂ , kilotonnes	GWh	CO ₂ , kilotonnes
Premises						
Electricity	445	85.1	453	86.6	-2 %	-2 %
Cooling	5.24	0.32	3.54	0.22	32 %	48 %
District heating	1,081	174	1,073	185	1 %	-6 %
Premises, total	1,531	259	1,530	271	0 %	-4 %
Outdoor lighting, traffic lights						
Outdoor lighting	45.6	8.70	46.8	8.93	-3 %	-3 %
Traffic lights	1.31	0.25	1.34	0.26	-3 %	-2 %
Outdoor lighting, total	46.9	8.95	48.1	9.19	-3 %	-3 %
Public areas						
Electricity	3.84	0.73	4.21	0.80	-10 %	-9 %
Heating	3.97	0.64	3.29	0.57	17 %	13 %
Public areas, total	7.81	1.37	7.50	1.37	4 %	0 %
Traffic						
Metro traffic*	68.7	0.0	73.1	0.0	-6 %	0 %
Tram traffic*	32.8	0.0	30.6	0.0	7 %	0 %
Ferry traffic	6.54	1.65	6.31	1.65	4 %	0 %
Traffic, total	108	1.65	110	1.65	-2 %	0 %
Vehicles and machinery	17.80	4.59	18.06	4.66	-1 %	-1 %
Total	1,712	276	1,714	284	0 %	-3 %

The CO₂ emissions for 2018 have been calculated by using the emission factors of Helen Oy, which are the following:

District heating	161 g/kWh	Helen's district heating product with renewable district heating subtracted
Electricity	191 g/kWh	The factor for 2018 is not available
Cooling	61 g/kWh	The factor for 2018 is not available

*The electricity used by Helsinki City Transport for transport operations is 100% renewable

The CO₂ emissions for 2017 have been calculated by using the emission factors of Helen Oy, which are the following:

District heating	172 g/kWh
Electricity	191 g/kWh
Cooling	61 g/kWh

The energy consumption and greenhouse emissions per capita of the City's own operations have decreased in Helsinki. The most important reasons for this are the improved energy efficiency of buildings and electrical appliances, such as lighting, as well as the improved energy efficiency of vehicles.

use separate heating; they are mainly heated using district heating. Because of this, the emissions from the energy consumption of the City premises are created in centralised energy production. The share of the City itself of the consumption of electricity in the Helsinki urban area amounted to 14 per cent, its consumption of heating amounted to 16 per cent and its consumption of district cooling amounted to 2.8 per cent.

The energy consumption and CO₂ emissions of the City in 2017 and 2018 are presented in the table on the previous spread. The City's emissions decreased by three per cent from the previous year. In 2018, the majority of the emissions (94 %) were caused by the energy consumption of premises.

The total energy consumption of the Helsinki Group in 2018 was at 1,712 GWh, which is similar to previous year. The energy consumption levels of premises are similar to those of the previous year; only the proportion of district cooling has increased when new district cooling locations have been introduced. With its energy efficiency actions, the City has managed to reduce the energy consumption of public areas and lighting since 2017.

The electricity consumption of metro traffic decreased by six per cent from the previous year, due to the introduction of the Länsimetro connection, which removed the need for test runs and balanced the electricity consumption. As for tram traffic, electricity consumption increased by seven per cent due to the increased mileage caused by the

line reform. However, the consumption of tram traffic has decreased in relation to the mileage as old vehicles have been replaced with energy-efficient Artic cars.

District heating amounted to 63 per cent of the City's total consumption (1,085 GWh), electricity amounted to 35 per cent (604 GWh), cooling amounted to 0.3 per cent (5.2 GWh) and fuels amounted to 1.0 per cent (17.8 GWh).

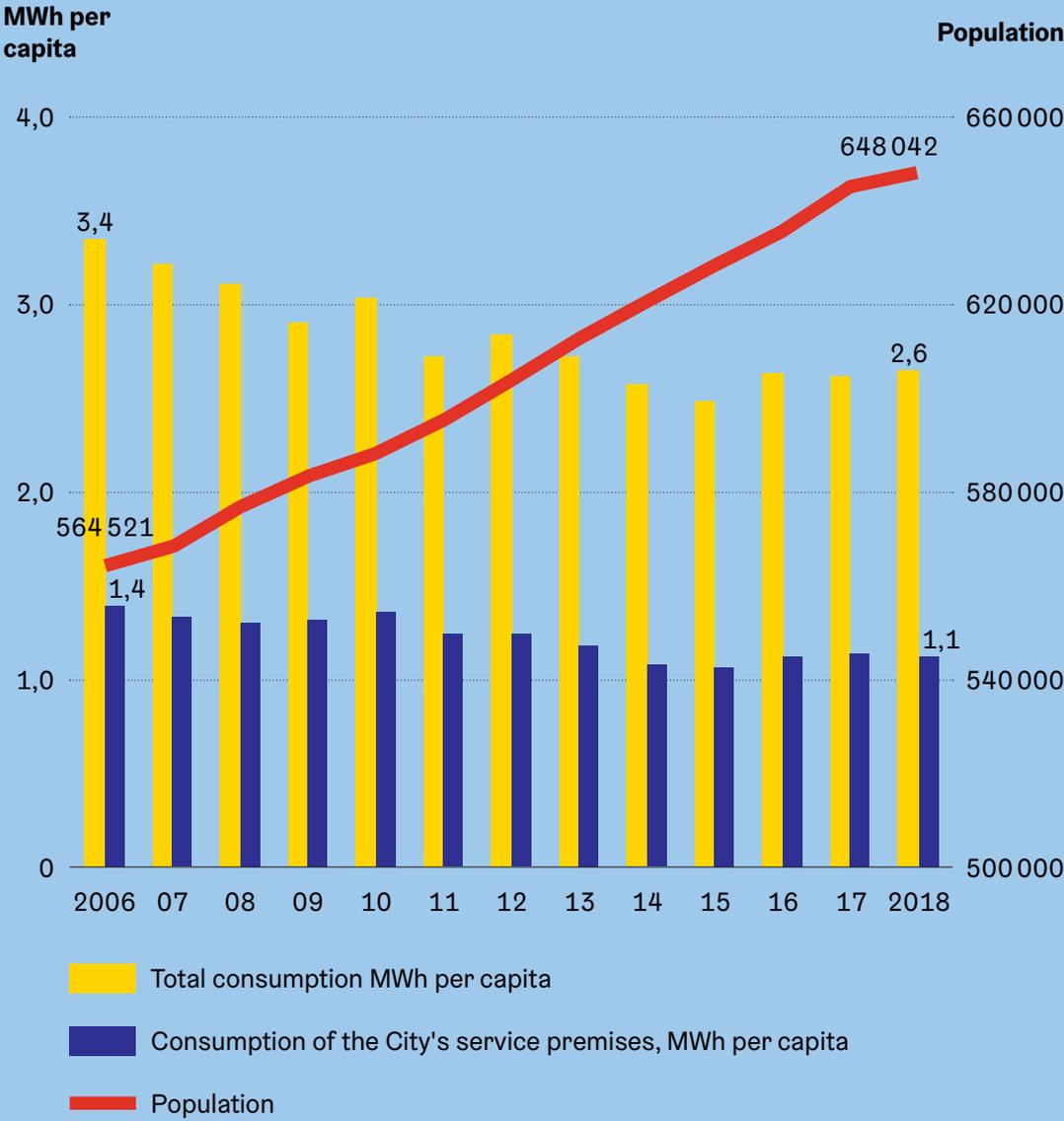
The energy consumption and greenhouse emissions per capita of the City's own operations have decreased in Helsinki. The most important reasons for this are the improved energy efficiency of buildings and electrical appliances, such as lighting, as well as the improved energy efficiency of vehicles.

The figure presents the development of the energy consumption per capita in the City's own operations and the population of the City in 2007–2018. The population has grown by 15 per cent during this period. At the same time, energy consumption per capita has decreased by 23 per cent. When looking only at the energy consumption of the City's service premises per capita, we can see that this number has also decreased by 21 per cent.

Helsinki's objective of carbon neutrality requires that the production of renewable energy be increased significantly. The potential for using renewable energy will be studied in all of the City's extensive modernisation and construction projects.

The City has had an ongoing project for

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



The figure presents the development of the energy consumption per capita in the City's own operations and the population of the City in 2007–2018. The population has grown by 15 per cent during this period. At the same time, energy consumption per capita has decreased by 23 per cent. When looking only at the energy consumption of the City's service premises per capita, we can see that this number has also decreased by 21 per cent.

Helen and Heka implemented an extensive joint research & development project on the demand response of heating. Helen introduced a new measuring and reporting service for indoor temperature and humidity to Heka's apartments. With the service, the energy efficiency of apartment buildings can be improved cost-efficiently and easily.

a couple of years where solar power stations are retroactively installed in suitable buildings. The City of Helsinki is also involved in the joint procurement of municipalities, tendered for in 2016, regarding solar electricity stations. At this moment, stations have been completed for almost 20 buildings. The peak effect of a typical solar power station is 40–50 kWp. Thanks to solar power, the consumption of a building's purchased electricity is typically reduced by 2–20 per cent.

In 2018, solar power systems were installed in the following sites:

- Wholesale Meat Hall of the Wholesale Market (65.6 kWp)
- Mellunkylä rescue station (42.4 kWp)
- Yliskylä day care centre (25 kWp), the new building of which uses both solar electricity and geothermal heat and is becoming largely self-sufficient in terms of energy.

In addition to these projects, power stations are being constructed at the Roihupelto metro depot (480 kWp), Neulanen day care centre (23 kWp), the new freezing plant of the Wholesale Market (350 kWp) and the roofs of Puistopolku comprehensive school, Arabia community centre and the expansion to Vesala comprehensive school (spring 2019). The campus of Metropolia University of Applied Sciences in Myllypuro will get a solar electricity station in multiple stages. New potential sites for solar power are constantly being sought and implemented. When taking into account sites that are

known and that will be finished in the near future, an electricity production capacity of 2.5 MW becomes closer to being a reality (in which case the calculated annual production would be at 2.3 GWh).

Energy surveys have been carried out systematically for City-owned premises, in accordance with Motiva's model, to find economically feasible energy conservation options. An energy survey has been carried out at least once for 85 per cent (of the gross area) of the City's public premises, and approximately 50 per cent of the suggested and economically feasible energy conservation actions have been implemented, and the buildings' specific consumption of heating has constantly decreased as a result. The electricity consumption has not increased in the last few years, either, despite the growing number of electrical appliances. Follow-up surveys or energy surveys upon deployment are made when necessary.

In addition to auditing operations, the City is also constantly implementing individual energy efficiency projects. In 2018, the City improved the energy efficiency of the ventilation and heating at Viikki Environment House and the Herttoniemi and Mellunkylä rescue stations, among others. In addition, more energy-efficient lighting solutions have been introduced to several sites.

In 2018, a bidding competition was held for a modern system for monitoring energy consumption and conditions that could meet future needs. The construction of the system





started out well, but the actual deployment will only happen during 2019. The new energy consumption and condition monitoring system will be a multi-functional tool for the energy management of premises so that indoor conditions and energy consumption can be optimised as needed in the future.

Helen and Heka implemented an extensive joint research & development project on the demand response of heating. Helen introduced a new measuring and reporting service for indoor temperature and humidity to Heka's apartments. With the service, the energy efficiency of apartment buildings can be improved cost-efficiently and easily. The project began in summer 2017, and the measuring and reporting service was successfully extended to all of Heka's apartment buildings during 2018.

The service is used to monitor the temperatures in the apartments, which allows the heating to be controlled more accurately based on outdoor temperature. For residents, this means that indoor temperatures stay at a desired level even when outdoor temperatures fluctuate rapidly. In winter 2018–2019, it was studied how the demand response of heating can be implemented with different methods. The normalised annual consumption of district heating decreased by 4.6 per cent, which is much higher than the target.

The Energy Wise Cities (Ekat) project of the Six City Strategy, funded by the European Regional Development Fund, started in 2018. The goal of the project is to make the participating cities, Helsinki, Tampere, Turku, Oulu, Espoo and Vantaa international examples of energy efficient living, zero-energy construction, the implementation of a diverse energy system, the monitoring of energy efficiency and guiding users. In an energy-wise city, buildings and areas are an active part of the energy system as energy producers, storage holders and consumers. Energy-efficient and low-carbon buildings enable the use of renewable energy, real-time monitoring of energy consumption and local zero-energy and surplus-energy systems. In Helsinki's version of the project, the City focuses on improving the steering of lifecycle goals for

service buildings, creating a concept for 'service buildings as virtual power plants', visualising data and sharing it to users, as well as developing energy efficiency partnerships. The project will run until the end of 2020, but results can be used even earlier.

By the end of 2025, the total energy savings achieved by the known new energy efficiency actions of the City will have amounted to approximately 13 GWh, which is 11 per cent of the total savings target for the duration of the agreement. As defined in the intermediate goals of the energy efficiency agreements, the City of Helsinki should have achieved verified energy savings of 62.4 GWh by the end of 2020; 21 per cent of this was achieved by the end of 2018. Achieving the energy savings goals requires systematic implementation of the energy savings actions and investments in the coming years.

Helen is constantly striving to improve the energy efficiency of its energy production and distribution. Helen's goal for the production and procurement of electricity and heating is to increase the proportion of renewable energy to 25 per cent, reduce greenhouse gas emissions by 40 per cent, and halve the use of coal by 2025. The use of coal will end completely in 2029 as decreed by the national act on prohibiting the use of coal for energy. Helen's long-term goal is to achieve climate-neutral energy production by 2035.

In Helen's co-production of district heating and electricity, the consumption of fuel amounted to 12,244 GWh in 2018. This equals 59 per cent of the volume of fuel needed to produce electricity at condensation power plants and heating at property-specific plants. The estimated savings amounted to 8,400 GWh last year, which equals 740 tonnes of heavy fuel oil.

In 2018, the efficiency of Helen's energy system was at 94.4 per cent, which is unprecedentedly high. The proportion of renewable energy increased to 12 per cent from 10 per cent. Renewable energy was produced with wood pellets, biogas and heat pumps, among others. In 2018, the Salmisaari pellet heating station and the Esplanadi heat pump station were completed.

Traffic

In accordance with the City Strategy, the percentage of sustainable modes of transport will be increased and Helsinki will be a pioneer in comprehensive smart transport systems. The emission reductions of traffic are realised by increasing the popularity of cycling and walking and by increasing the percentage of electric cars, electric buses and rail-based public transport. Helsinki promotes transferring to a call-based transport system and works as a test bed to commercialise new smart transport services made possible by the Transport Code (e.g. Mobility as a Service) and to promote future technology.

The Helsinki region was ranked second in the international BEST ranking, for the

In spring 2018, HSL opened one of the world's first open-to-all resales interfaces for mobile tickets, OpenMaaS.

fourth year in a row. In the BEST survey, customer satisfaction ratings of the public transport of eight European cities were compared. In 2018, customer satisfaction was at 75 per cent.

In spring 2018, HSL opened one of the world's first open-to-all resales interfaces for mobile tickets, OpenMaaS. During the year, the resales interface was developed further, and at the end of the year, single-use and one-day mobile tickets, as well as personal season tickets, were made available on the interface. The OpenMaaS interface allows Mobility as a Service (MaaS) operators and other parties interested reselling public transport tickets to integrate the service into their own services and offers opportunities to develop service-oriented transport.

HSL started the two-year IdeaLab project, which started out with a competition for new and sustainable mobility services,

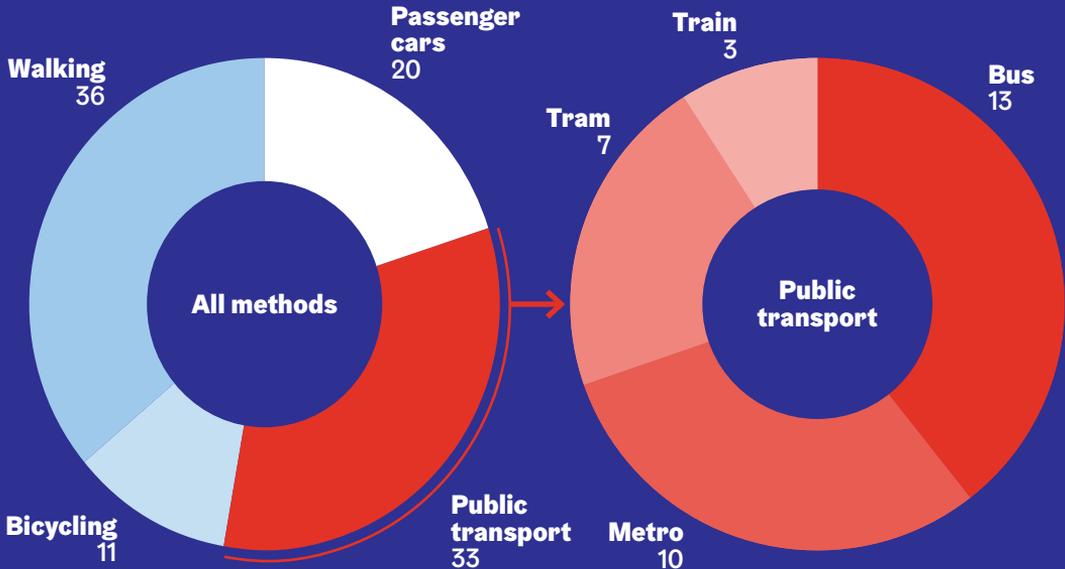
the HSL IdeaLab Contest for New Mobility Services. The total number of entries submitted for the competition was 26, out of which the jury selected two winners. HSL will pilot a station-based scooter service in Vuosaari and an on-demand mobility service in Espoo in 2019, together with the winner companies.

The City of Helsinki started updating the development programme for smart traffic. The development programme recognises the development trends and changes to the operating environment of smart traffic. Development measures and the role of Helsinki in the digitalisation of traffic will be defined in the programme. In the development programme, 2030 will be set as the target year for the digitalisation of traffic. The actions for 2019–2024 will be programmed as ten practical actions that can be implemented through co-operation with other operators in the sector. The updating of the development programme for smart traffic is underway and will be completed by the end of June 2019. The development programme is used to produce data for the preparation of the budget for the coming years. The programme created as the result of the update will replace the former 'Smart Traffic in Helsinki' development programme created in 2013.

In 2018, Helsinki's electric traffic work group prepared a bidding competition through which an operator was to be selected to implement and operate 20 public charging stations for electric cars in the inner city area. With this method, the City expected to gain 40–80 new public charging points (each charging station would have 2–4 points). The bidding competition was held in early 2019. Helen won the competition, and will implement the charging stations during the spring and summer. Approximately 90 per cent of the charging stations must be implemented and ready for use by the end of October 2019.

Distribution of modes of transport

Primary means of transport on trips made within Helsinki; percentage of all trips



City bikes



As wished by the users, the cycling season started a month earlier, in April.

According to the study commissioned by the City, the usage rate of the Helsinki city bikes is one of the best in the world.

The city bike system expanded to Espoo.

The service exceeded its financial goals.

To balance the number of bikes, a demand-predicting system was launched for stations.

The city bike service received the Service Achievement of the Year 2018 at an event by the Finnish Service Alliance.

Regular robotic bus traffic was piloted for the first time in Helsinki when a self-driving bus operated in Kivikko from May to the end of October.

An experiment by HSL and VR was turned into a permanent policy in 2018: bicycles can be transported on local trains at all times, as long as there is room. According to a survey by HSL, 79 per cent of respondents were in favour of transporting bikes on local trains at all times, provided there is room, while 76 per cent were in favour of transporting bikes on the metro. For its part, HKL introduced bike maintenance points at metro stations to help cyclists. A maintenance bench includes many multi-functional tools, a ring spanner and a foot pump, with which a commuter, for example, can pump up their bike tyres or tighten a loose chain.

Helsinki was accepted into an EU project called Handshake, in which the cycling traffic of ten European cities is developed by using best practices from Copenhagen, Amsterdam and München. Copenhagen is Helsinki's mentor in the project. Like all of the mentor cities, Copenhagen has extensive experience in developing an urban environment that is friendly to cyclists and people in general. Helsinki seeks to learn especially about the development of traffic infrastructure and traffic lights, the improvement of maintenance, how to update the development programme for bicycle traffic and how to communicate changes. The project is a part of the Horizon 2020 project entity of the EU, and it will continue until spring 2022.

HSL's goal is to reduce the local emissions of public transport that affect air quality, as well as the carbon dioxide emissions, by over 90 per cent from the level of 2010 by 2025. Steps towards this goal were taken in 2018 when HSL organised a bidding

competition for electric buses. After the bidding competition, 30 new electric buses will be obtained in 2019, and 5 more will be obtained in 2020. The goal is that almost 30 per cent of the fleet operating in traffic ordered by HSL would consist of electric buses in 2025. Furthermore, HSL decided to continue the environmental bonus model which has proven to reduce emissions effectively. Two million euros have been reserved for the environmental bonus model for 2019.

Regular robotic bus traffic was piloted for the first time in Helsinki when a self-driving bus operated in Kivikko from May to the end of October, from the Kivikonlaita service station to the Kivikko activity park. By the end of the pilot, 1,300 passengers had travelled by a robotic bus. The pilot was a part of the EU-wide mySMARTLife project. The Helsinki RoboBusLine experiments are planned to be continued in 2019 and 2020.

The development of robotic buses is also one of the goals of the FABULOS project, a part of the EU's Horizon 2020 project entity, in which five business consortiums were selected in the pre-commercial procurement phase in 2018. The consortiums comprise 16 companies from 6 European countries in total. In 2019, the consortiums will carry out feasibility studies on the suggested solutions. The most promising solutions will progress further into the prototype and laboratory testing phases. The actual traffic tests for the project are expected to start in 2020. The project is coordinated by Forum Virium Helsinki.

The draft for the shared Land Use, Living and Traffic Plan (MAL plan 2019) of 14 municipalities in the Helsinki region was

completed in October 2018. One of the goals of the plan is to reduce traffic emissions in the region by 50 per cent from the level of 2005 by 2030. According to the draft, the goals can be achieved by steering the growth of the region to areas that are competitive in terms of public transport, investing heavily in rail and cycling traffic, planning and developing road traffic by focusing on freight and public transport and advancing the introduction of a road toll system that will reduce mileage and direct the vehicle stock towards lower emissions. The MAL draft was sent for commenting at the end of 2018. The plan is expected to be ready for decision-making in early 2019, and the MAL agreement for 2020–2023 will be negotiated on between the State, the municipalities of the region and HSL.

Of the 147 actions in the Carbon-neutral Helsinki 2035 Action Plan, 30 are related to the emissions reductions of traffic. The City's goal is to reduce the greenhouse gas emissions from traffic by 69 per cent from the 2005 level by 2035. Finland's national goal is to reduce emissions by 50 per cent by 2030. The actions are related to increasing the number of charging stations for electric cars, reducing the emissions from heavy traffic and the harbour operations, further studies on a pricing system for vehicle traffic, raising the prices for parking, promoting sustainable modes of transport, such as walking, cycling and public trans-

port, introducing new mobility services and densifying the city structure.

The amount of motor vehicle traffic decreased in 2018 by six per cent at the border of the Helsinki peninsula and by one per cent at the border of the inner city compared to the previous year. Last year, the volume of motor vehicle traffic decreased by one per cent both at the City border and in crosstown traffic.

The average bicycle traffic at the border of the peninsula on a weekday in June increased by three per cent, compared to the previous year. As for passenger car traffic, the number of passengers at the border of the peninsula on an autumn weekday decreased compared to the previous year (–6.7%). In morning traffic towards the city centre at the border of the peninsula, the number of passengers decreased, compared to the previous year (–3.6%). In crosstown traffic, the number of travellers using public transport fell (–0.1%) while the number of passengers travelling by car grew (+2.6%) compared to 2017. As for public transport, the 2018 information on the traffic in the peninsula and in the inner city was not yet available for the report.

The number of Helsinki residents owning a car went up by 0.4 per cent (413 cars/1,000 inhabitants) and the number of cars in traffic use decreased by 0.1 per cent (329 cars/1,000 inhabitants) compared to 2017.



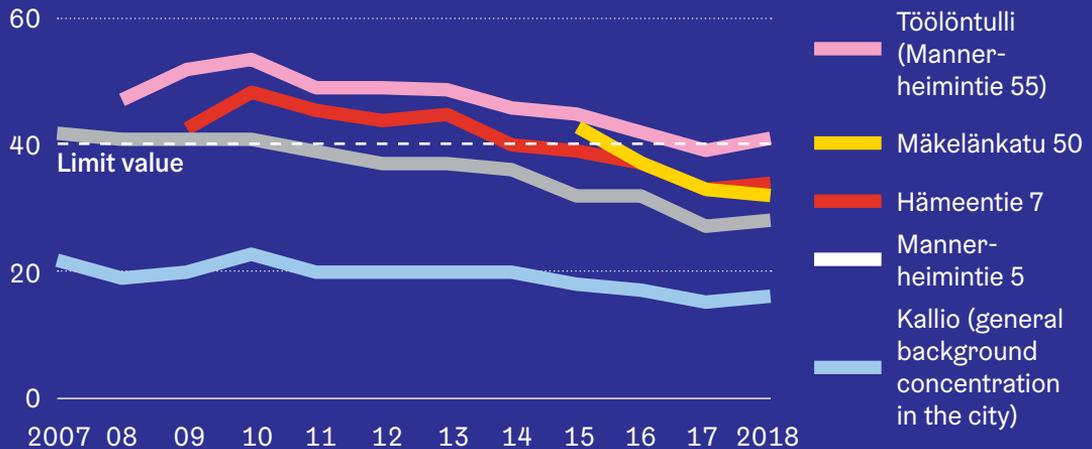
Eyes on the future

The population of Helsinki is growing and the land use is becoming denser, which is why it is particularly important to control the harmful impacts of traffic. Key actions in this sector include land use planning, promoting a public transport system and other sustainable modes of transport, implementing and introducing a pricing system for vehicle traffic, creating conditions for an increased number of low-emission vehicles, improving the functionality of city logistics, using digitalisation for developing smarter traffic data and traffic control methods, and facilitating sustainable choices of transport through data.

Air protection

Nitrogen dioxide (NO₂) concentrations in ambient air

Annual average nitrogen dioxide (NO₂) concentrations measured by HSY's monitoring stations and passive samplers, µg/m³



Particulate matter (PM₁₀) concentrations in ambient air

The number of days when the limit value level (50 µg/m³) for particulate matter (PM₁₀) was exceeded in the air quality measurement stations in Helsinki. The limit value is exceeded if the number of days with PM₁₀ levels above 50 µg/m³ is more than 35/year.



In the City Strategy, the goal is to lower the emissions of the transport system further and also reduce the emissions harmful to health significantly. The air quality in Helsinki has improved over the last few decades, and it is fairly good at an international level. However, the health-based annual limit of nitrogen dioxide, specified in the EU's Air Quality Directive, is still exceeded in places in the city centre's street canyons. The reason for this is the exhaust emissions from traffic, in particular diesel vehicles. There is still a risk that the limit value for particulate matter, or street dust, will be exceeded. In single-family dwelling areas, the air quality is decreased by the small-scale burning of wood in fireplaces and sauna stoves.

In 2018, the air quality was poorer than in the previous year, and the concentrations of most impurities were higher. The reason for this was probably the unfavourable weather conditions. The concentrations of nitrogen dioxide have decreased especially in recent years, and the annual limit's exceedance area is estimated to have decreased each year. No limit values were exceeded at HSY's active measuring stations, but they were exceeded at two passive collection stations. The car stock has become lower-emission. The upgrades to HSL's bus fleet also impact air quality.

The City's Air Protection Plan is intended to reduce nitrogen dioxide emissions from traffic so that the emissions will fall below the annual limit as soon as possible. In addition to traffic emissions, street dust and small-scale burning of wood are significant factors affecting air quality in the City.

In 2018, the concentrations of respirable particles (PM₁₀) were clearly below the limit values. Due to effective dust prevention, the limit values have not been exceeded since 2006. However, street dust continues to weaken the general air quality in the spring. The dust situation in spring 2018 was poorer than in the previous year, largely due to the weather conditions. Therefore, it is very important to continue investing in the prevention of street dust. The City is actively involved in projects studying the sources of street dust and methods of reducing it, such as the effect of studded tyres and tramlines

in dust regeneration, for example. A long-term project on the sources of street dust, emissions reduction actions and air quality impacts, shared by Vantaa, HSY, Kuopio, Metropolia and the Finnish Environment Institute, is underway.

At the end of 2018, a three-year, extensive air quality project Healthy Outdoor Premises for Everyone (HOPE), funded by the EU's Urban Innovative Actions (UIA) programme, was started. The project is coordinated by the City of Helsinki, and its partners include the University of Helsinki, the Finnish Meteorological Institute, HSY, Vaisala, Forum Virium and Useless. The aim is to produce more diverse data on air quality, as well as actions for improving air quality. In Helsinki, the concentrations of air pollutants are measured with sensors in three different environments.

In the KAILA project of the City and HSY, air quality was measured at the Mäkelänkatu street at different height levels and distances from the street. Valuable information was gained for the needs of city planning. The report on the project will be published in spring 2019.

The City also participated in the KIUAS project of the University of Eastern Finland where the emissions from sauna stoves were studied and measurement methods were developed. Information on how to heat a sauna in a low-emission manner was shared with residents.



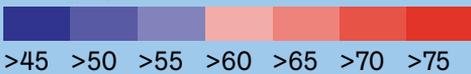
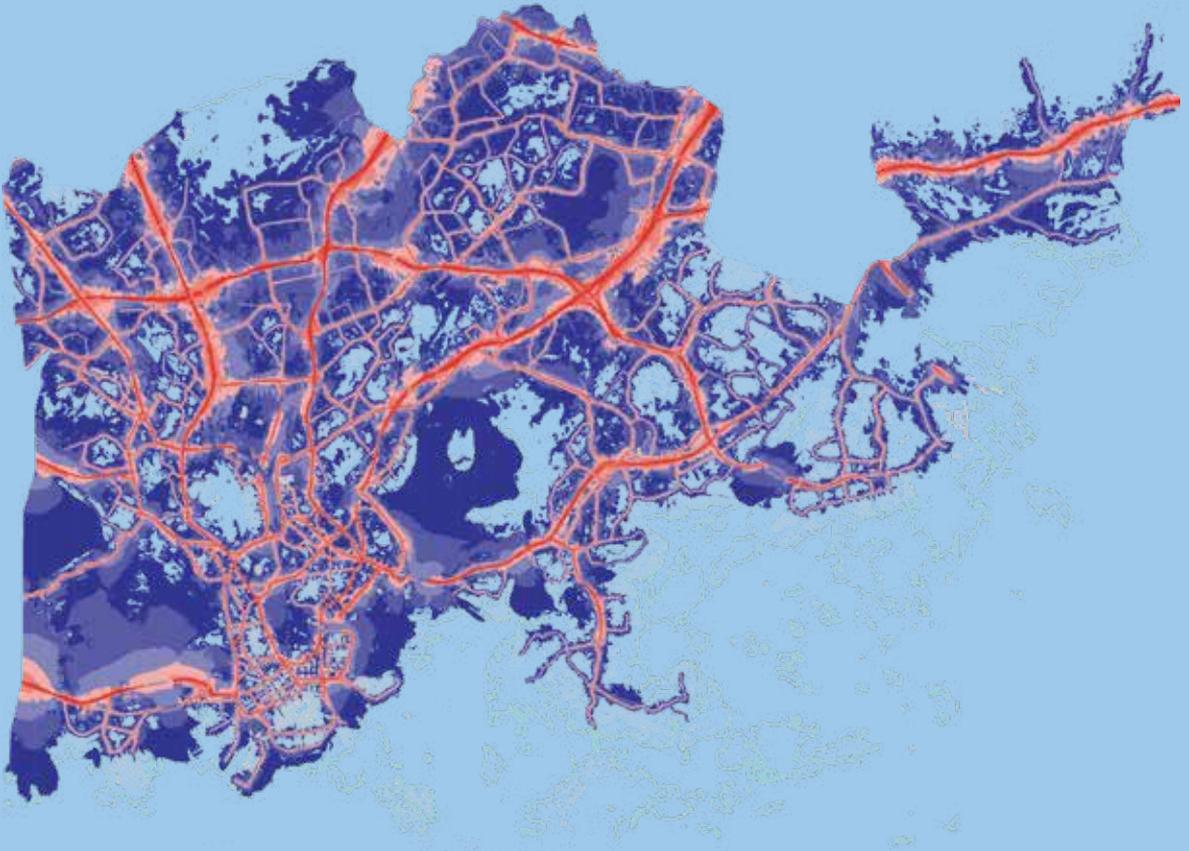
Eyes on the future

The exhaust gas emissions from traffic are on the decrease, but the reduction is slowed by the increasing traffic volumes, the densifying city structure and the car stock renewing slowly. Street dust will remain a challenge in the future. Influencing people's choice of winter tyres and focusing on the prevention of street dust are extremely important actions. The emissions from burning wood will continue to decrease air quality in single-family dwelling areas since the use of bioenergy will increase, the residential areas will have new buildings and the fireplace stock is slow to renew.

Noise abatement

Day-time average noise level

dB



Environmental noise is a significant factor that affects the quality and comfort of the living environment in Helsinki. Continuous loud noise also causes health hazards. Road traffic is the primary source of harmful noise. 37 per cent of the residents of Helsinki live in areas where the noise level caused by road traffic exceeds the limit value of 55 dB during the day. Noise is locally caused also, for example, by construction and repair works, public events and restaurants.

In accordance with the City Strategy, traffic investments and land use are always planned together in Helsinki, which makes it possible to pay attention to noise abatement. The noise abatement operations in the City of Helsinki are directed by the noise abatement plan 2018–2022. Noise abatement through land use planning and traffic planning is at the heart of the plan. In addition, noise abatement actions are needed: these include noise-absorbing road surface materials, lower speed limits and reducing the use of studded tyres. Building-specific solutions, such as improving the soundproofing of windows, are important, especially by busy streets.

In 2018, three noise barrier projects were ongoing: Noise barriers were built at Sepänmäki on Ring I, at Yhdyskunnantie on Tuusulanväylä and at Herttoniemi on Itäväylä. The former were implemented in co-operation with the Finnish Transport Infrastructure Agency. Noise-reducing surfaces were implemented on Professorintie and Pakilantie streets. The principles for defining speed limits were approved in 2018. Speed limits will be lowered in many parts of the City, which will also reduce noise. The use of speed cameras and speed screens has been increased in the City.

Construction and renovation work on the infrastructure network were made in 2018 on Mechelininkatu and in Urheilulehto. In connection with these long-term projects, it was seen that efficient communications regarding the progress of construction work and upcoming disturbances diminishes

the harmful noise effects experienced by residents.

The project to monitor the environmental hazards in the City's construction projects continued in five neighbourhood construction sites: Central Pasila, Kalasatama, Jätkäsaari, Kruunuvuorenranta and Kuninkaantammi. Noise, dust, storage of chemicals and waste management on the sites were under enhanced monitoring. HSY measured small particles (PM₁₀) in Kalasatama. At these sites, a lot of pile driving, excavation and crushing were carried out in 2018, of which noise disturbance notifications were made. To prevent the construction site noise that will last for years from being unreasonable to the residents living in these areas, conducting the noisiest work at evenings or weekends without a legitimate reason was not allowed. Advance notice to the area's residents was required for work causing noise.

In 2018, the resident survey on the environmental impact of outdoor concerts was conducted after three years. The preparation of the noise reporting decisions regarding large outdoor concerts used end-time policies with which the disturbances experienced by the local residents by large and late music events could be diminished. The policies concerned the venues in Kaivopuisto, Hietaniemi, Wholesale Market-Teurastamo, Suvilahti, Kyläsaari, Kaisaniemi, Töölönlahti Park, Mäntymäki Field, the Ice Hall parking space, Malmi Airport and Kansalaisympäristö Square. Good prior provision of information has been shown to reduce the noise disturbance experienced by residents.



Eyes on the future

Due to population growth, the need for mobility will increase in Helsinki, and the city structure will become denser. This is why we need to pay even more attention to noise abatement. Extensive infrastructure projects and local construction projects will continue for several years.

Water protection

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 significance of the sea will be strengthened and opening the nearby archipelago to public use will be continued.

The water areas in Helsinki include extensive marine areas, as well as the freshwater areas of the Vantaa River, various streams, ditches, ponds and springs. The water quality of the City is affected by the impurities in storm water, nutrients brought by scattered loading, cleaned sewage led to the outer archipelago, human activities, the muddy waters flowing from the Vantaa River, and the state of the Gulf of Finland. In addition to the

During 2018, surveys on the spread of cleansed sewage were conducted.

environmental policy, water protection in Helsinki is regulated by the Small Water Bodies Programme, the Storm Water Strategy, the flooding instructions and the Action Plan for the Baltic Sea Challenge.

Over a million people live in the impact area of the Vantaa River, and the river winds for over 100 km from Riihimäki to the bay in Vanhakaupunki. The river is a valuable and attractive fishing location where Atlantic salmon and Brown trout travel up to spawn. In accordance with the ecological classification, the condition of the Vantaa River is satisfactory, but the Kytäjoki river area and the upper reaches of the Kerava River are in good condition. A good condition would be achievable in the lower reaches as well if the annual median of the overall phosphorus concentration were to reach a level of 60 µg/l. Phosphorus and nitrogen come from sewage and agriculture. In the gypsum project on the Vantaa River, almost 3,500 hectares of fields in the catchment area of the Vantaa River are treated with

gypsum in 2018–2020. The gypsum treatment reduces the nutrient and sediment load on the Vantaa River and the Gulf of Finland, improving the ecological state and recreational value of the water areas.

The Urban Environment Division monitors sea areas in accordance with the Helsinki Metropolitan Area's common monitoring programme for marine areas. In 2018, some significant anomalies were observed in the water quality of marine areas. In summer 2018, the presence of blue-green algae in Helsinki's marine areas was more extensive than ever in the past decade.

The surface temperatures of seawater were exceptionally high throughout the summer, reaching 25°C at their highest. The warm and still weather and the higher-than-normal concentrations of soluble phosphorus accelerated the extensive growth of blue-green algae in the sea areas by the coast of Helsinki. Beaches coloured by blue-green algae were observed along the coast of the Helsinki Metropolitan Area as late as in September. Extensive blue-green algae growth was observed throughout the Baltic Sea in 2018.

During 2018, surveys on the spread of cleansed sewage, the part of the joint observation of the sea area where the impact of the nutrients in cleansed sewage on the nutrient limitations of the base-producing plankton in the water, and observation on the running of marine condensation water from power plants into the sea were also conducted.

The studies on the nutrient limitations of the base-producing plankton aim to assess the impact of cleansed sewage on the eutrophication of the sea areas by the coast of Helsinki. When sewage treatment plants are functioning normally, it is difficult to tell the eutrophication impact of the nutrient load apart from the natural fluctuation. However, a disturbance in the nitrogen removal of the Viikinmäki treatment plant at the end of July showed that if the treatment capacity of the plants decreases, the impact can be seen



even in areas that are relatively far away from the discharge areas of cleansed sewage.

The Urban Environment Division monitored the water quality of 35 streams and 21 ponds. In the Mätäjoki river, the results of the intensive observation were complemented with sediment studies and riverbed studies. The state of the riverbed was surveyed by using the River Habitat Survey and Urban River Survey methods, which have not been tested on urban streams in Finland before.

Work related to litter accumulating on beaches was continued in cooperation with the Finnish Environment Institute and the Keep the Archipelago Tidy Association. Site formation, dredging and shoreline construction increase litter.

The pond in the Saunapellonpuisto park in Viikki is being restored and monitored as the pond is hypertrophic due to the extremely dense fish population. To reduce the fish population, fishing activities have been organised at the pond and large perches have been transferred into the pond, but voluntary pond-cleaning activities were not organised in 2018.

The monitoring of the restoration of the Longinoja stream was continued with zoobenthos samples. The zoobenthos of the stream has been monitored in 2012, 2014, 2016 and 2018. Together with the fish population data from the Natural Resources Institute Finland, these materials enable studies on the impact of the restoration efforts.

The work on the principles concerning the handling of snow was continued. The number of snow reception sites has decreased in recent decades due to more compact land use. It is essential to find new handling locations, but establishing them involves various types of environmental hazards.

Work related to litter accumulating on

beaches was continued in cooperation with the Finnish Environment Institute and the Keep the Archipelago Tidy Association. Site formation, dredging and shoreline construction increase litter. The amount of litter was low in 2018, because no large fill work sites were in operation. The study on how to reduce the number of fuses within blasted rock materials was completed. In the Pikkukoski rapids of the Vantaa River, a waste-collecting barrier was tested in relation to studies in the Blastic project of the Finnish Environment Institute.

The geothermal heating work group of the Urban Environment Division completed its work. The report on the legislation, permit policies, land use planning and property right matters related to geothermal wells will be finished in early 2019.

In 2018, 94.8 million m³ of water was pumped into the water supply network of the HSY water supply area, while 53.6 million m³ was pumped into the Helsinki network. The water consumption per capita in Helsinki was 180 litres per day, which was the same as in 2017.

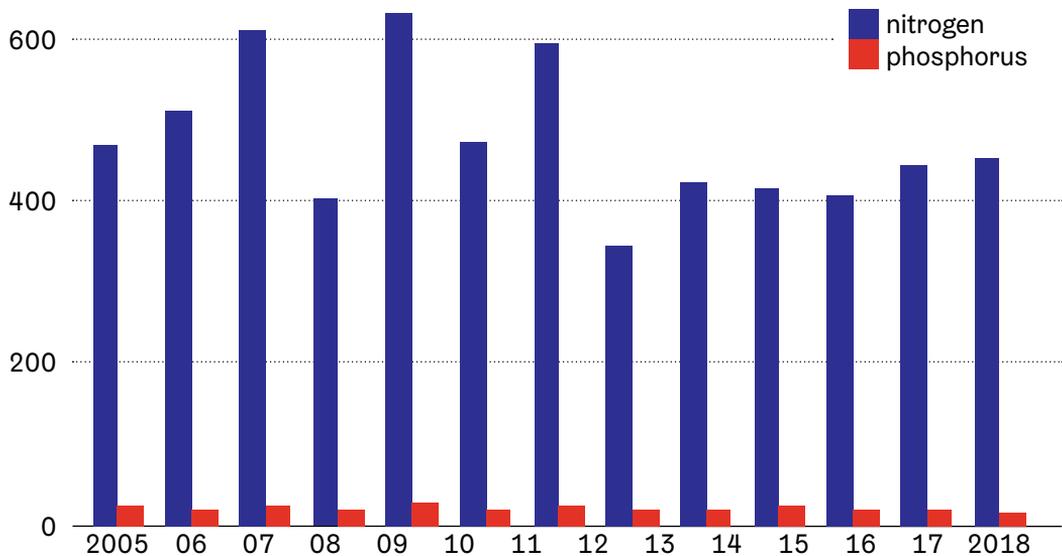
A total of 92 million m³ of sewage was delivered to the Viikinmäki sewage treatment plant for treatment, of which 66 million m³ came from Helsinki. The volume of sewage was lower than in the previous year. The Viikinmäki sewage treatment plant met all the environmental permit regulations. Combined sewer network overflows amounted to 0.06 per cent of the overall amount of wastewater.

The 2018 treatment efficiency for phosphorus in Viikinmäki was 97 per cent. For biological oxygen demand, the removal efficiency was 98 per cent, and for nitrogen, 91 per cent. The sewage treated at the Viikinmäki treatment plant are conducted through rock tunnels to the open sea, about eight kilometres away from the shore. The phosphorus load from the Viikinmäki sewage treatment plant on the sea areas in front of Helsinki was 15 tonnes (–25% from the 2017 level), and the nitrogen load was 454 tonnes (+2% from the 2017 level). For eutrophication, the nitrogen load is more significant, because nitrogen is a minimum nutrient in the waterways in the Helsinki region.

In 2018, HSY implemented campaigns related to the correct use of sewers, such

Load to the Sea

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



as 'Clean Sewer – Do you know the sewer etiquette?' The Pytty.fi campaign raised awareness of household chemicals ending up in water bodies. HSY was also involved in the co-operation campaigns 'Medicine-free Baltic Sea' and 'Recycled Nutrient'. On Helsinki Day on 12 June, the Viikinmäki sewage treatment plant held an open-to-all event.

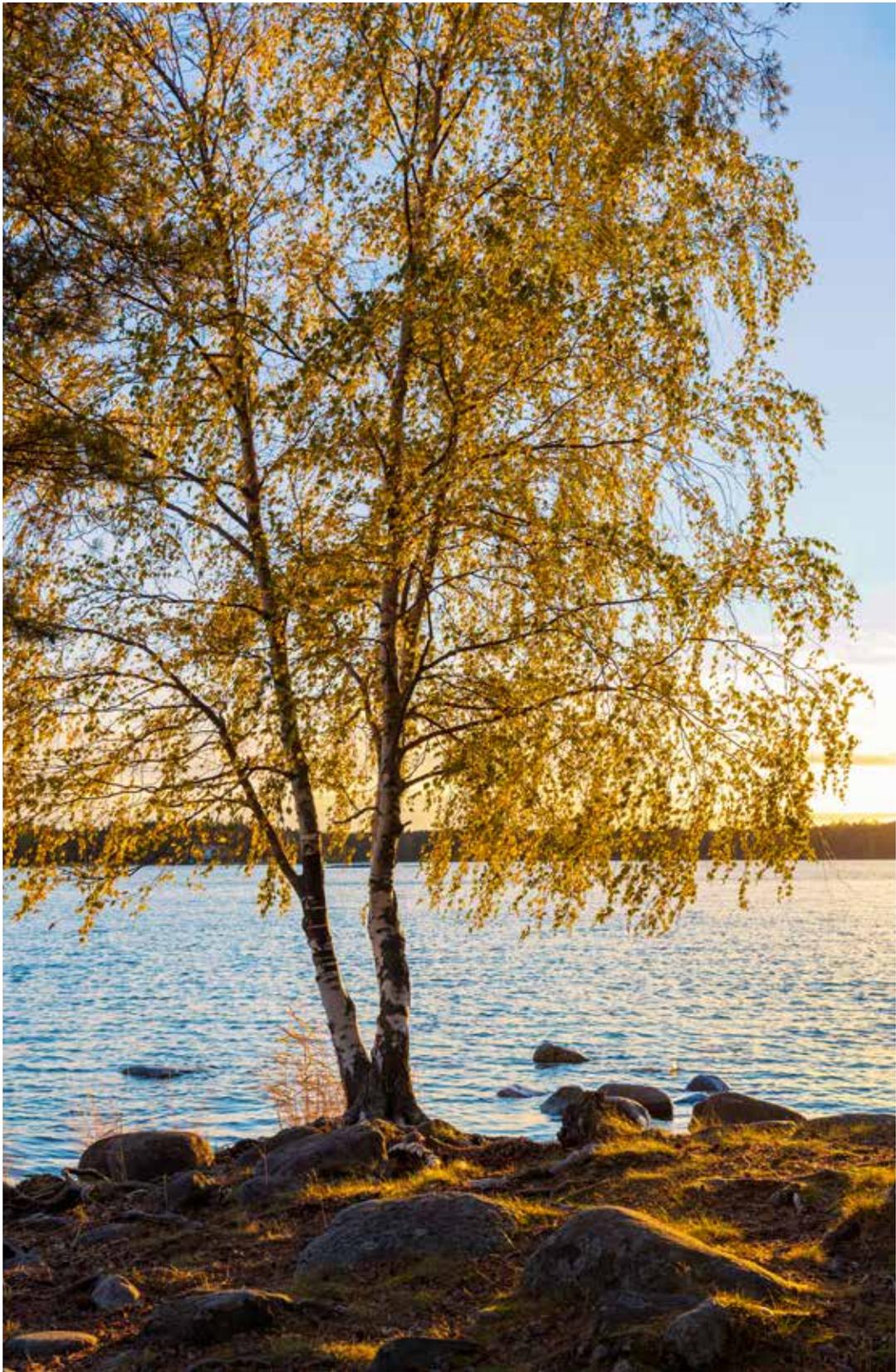
The vision in Helsinki and Turku's second joint Action Plan for the Baltic Sea in 2014–2018 is a clean, productive and shared Baltic Sea. Of the more than 80 actions in the programme, the sub-actions included, 24 were started, 40 were ongoing and 9 were finished by the end of the year. Many of the ongoing projects will never be 'finished' since they have become new, established ways of operating. It seems that ten of the actions will never be implemented, but they have practically been replaced with new, unforeseen operating models, co-operation projects or individual actions, particularly in matters related to international co-operation. During 2019, a complete assessment will be made on the implementation of the action plan for 2014–2018.

Actions related to littering, ship traffic, recreational sailing and communications, in particular, have been accelerated. A joint pre-

liminary debate of the City and the University of Helsinki was held regarding the development of the professorship co-operation on the economy of the protection of the Baltic Sea. During 2018, many of the unfinished matters of the Baltic Sea Action Plan were transferred into the new Storm Water Programme, while actions related to the systematic use of water areas were transferred into the Maritime Strategy. The City was largely involved in the preparation of the Maritime Strategy, and perspectives on the water environment and the state of the sea were brought forward.

The Baltic Sea challenge had a partner network of 270 organisations, and tools, events and forums are being created to support their own Baltic Sea and water conservation efforts. The annual seminar of the partner network was held in Turku in November, and there, 15 Star Partners in the Baltic Sea challenge received awards for their work through the years. During 2018, Helsinki's work on the Baltic Sea and the Baltic Sea challenge gained attention in international events. The Baltic Sea challenge was also present at the Independence Day celebrations hosted by the President of Finland.

A new, currently third Baltic Sea Action



Plan of Helsinki and Turku for 2019–2023 was also prepared mainly during 2018. To prepare the Action Plan, workshops were organised for experts and action templates were collected from the network partners. In addition, resident surveys were conducted in both Helsinki and Turku. The shared Baltic Sea challenge committee of the cities finished the preparation of the Action Plan in September 2018. The Boards of both cities approved the plan in October 2018. The new Baltic Sea Action Plan for 2019–2023 includes nearly 120 actions for the good of local waters and the entire Baltic Sea.

Implemented with the spearhead project funding from the Ministry of the Environment, the Urban Waters project of Helsinki and Espoo aims to reduce the nutrient and detrimental material load on the Baltic Sea by improving the quality of storm water with filtering methods based on biochar. The pilot sites are Maunulanpuisto in Helsinki and Otsonlahti in Espoo. As for Helsinki, the construction plans for the Maunulanpuro bio-filtering basin were completed in 2018.

In the BEST (Better Efficiency for Industrial Sewage Treatment) project, coordinated by the City of Helsinki and partially funded by the EU's Baltic Sea Interreg programme, the goal is to improve the control of industrial sewage at municipal sewage treatment plants in the Baltic Sea region. The project aims to promote the co-operation and good administration of municipalities, industrial companies and water utility companies in terms of industrial sewage treatment. During 2018, the project operators studied the current state of industrial sewage treatment and the legislation directing it in the Baltic Sea region by collecting statistics and organising inter-

views with industrial companies and sewage treatment plants. The know-how and competence regarding industrial sewage treatment were developed in three international events, of which the opening event of the project was held in Helsinki in February. The project is also used to implement investments that improve control over sewage both at sewage treatment plants and industrial companies, such as cheese production plants. The construction plans for the investments were completed in 2018. The BEST project has gained attention at both national and international events in 2018, such as the Baltic Sea Days in St Petersburg and several EU project events.

Helsinki is involved in the BSR WATER platform project, funded by the EU's Interreg Baltic Sea programme, until 2021. The project brings the flagship projects of the funding programme together, with the purpose of using and further processing the results of the projects, even after the projects have ended. From Helsinki, two projects were selected into this project: the iWater project focusing on storm water control and storm water solutions (2015–2018) and the BEST project focusing on industrial sewage (2017–2020). Best practices and solutions of the results and experiences of the selected projects will be shared for the treatment of household sewage and industrial sewage, sludge and storm water. In addition, the compilation of policy recommendations will be attempted with the goal of creating stronger legislation to support the protection of the Baltic Sea. The project involves ten partners: expert organisations and universities from Finland, Germany, Estonia, Poland, Latvia and Russia. The project is coordinated by the Union of the Baltic Cities.



Eyes on the future

Taking the Maritime Strategy of the City into account, the protection and monitoring of underwater nature in Helsinki sea areas will be developed by surveying the occurrence of endangered underwater natural types. The diffuse pollution from the City area into the local waters will be surveyed with the Storm Water Programme which will also support the implementation of the new action plan for the Baltic Sea challenge.

Securing biodiversity

In accordance with the City Strategy, Helsinki treasures its valuable nature and works to increase the diversity of urban nature. The ecological quality, accessibility and health effects of green areas will be secured, the Nature Conservation Programme will be carried out and the forest network will be strengthened. The systematic increase of diversity in forests and forested areas is the central objective of the treatment. The green surface area will be increased in the city structure to promote cost-effective management of storm waters, and the diversity of the City's parks will be increased.

The nature management policies approved by the City Board and the objectives of the LUMO programme will be adhered to in nature management. Land use planning strengthens the recreation and urban nature network and plans green infrastructure as an entity, by increasing green surfaces, providing compensation, supporting the green network and measuring green efficiency, amongst other methods. The impacts of climate change highlight the importance of measures planned for securing biodiversity.

To cherish the valuable nature of Helsinki and increase the diversity of the urban nature, an update to Helsinki's programme for securing biodiversity was started in 2018 by organising a seminar, some workshops and a map-based online survey for residents. The participation of organisations and residents has been active: for example, nearly 900 residents responded to the online survey. According to the responses, residents are interested in the diversity of Helsinki nature and consider nature to be close by. Respondents saw Vallisaari, Vanhankaupunginlahti and the Central Park as typical examples of nature in Helsinki. Residents expressed concern over the fragmentation of forests due to construction, among other concerns. It was considered important that the City area includes diverse types of forests, such

as groves, small local forests and coniferous, deciduous and mixed forests, the diversity of which is developed by increasing the amount of rotten wood in the forests and doing only light maintenance work, among other actions. Sea, beaches, rivers and streams were also considered to be an important part of Helsinki nature. Helsinki residents are also ready to take action to secure the diversity of nature: there is great interest towards voluntary restoration activities.

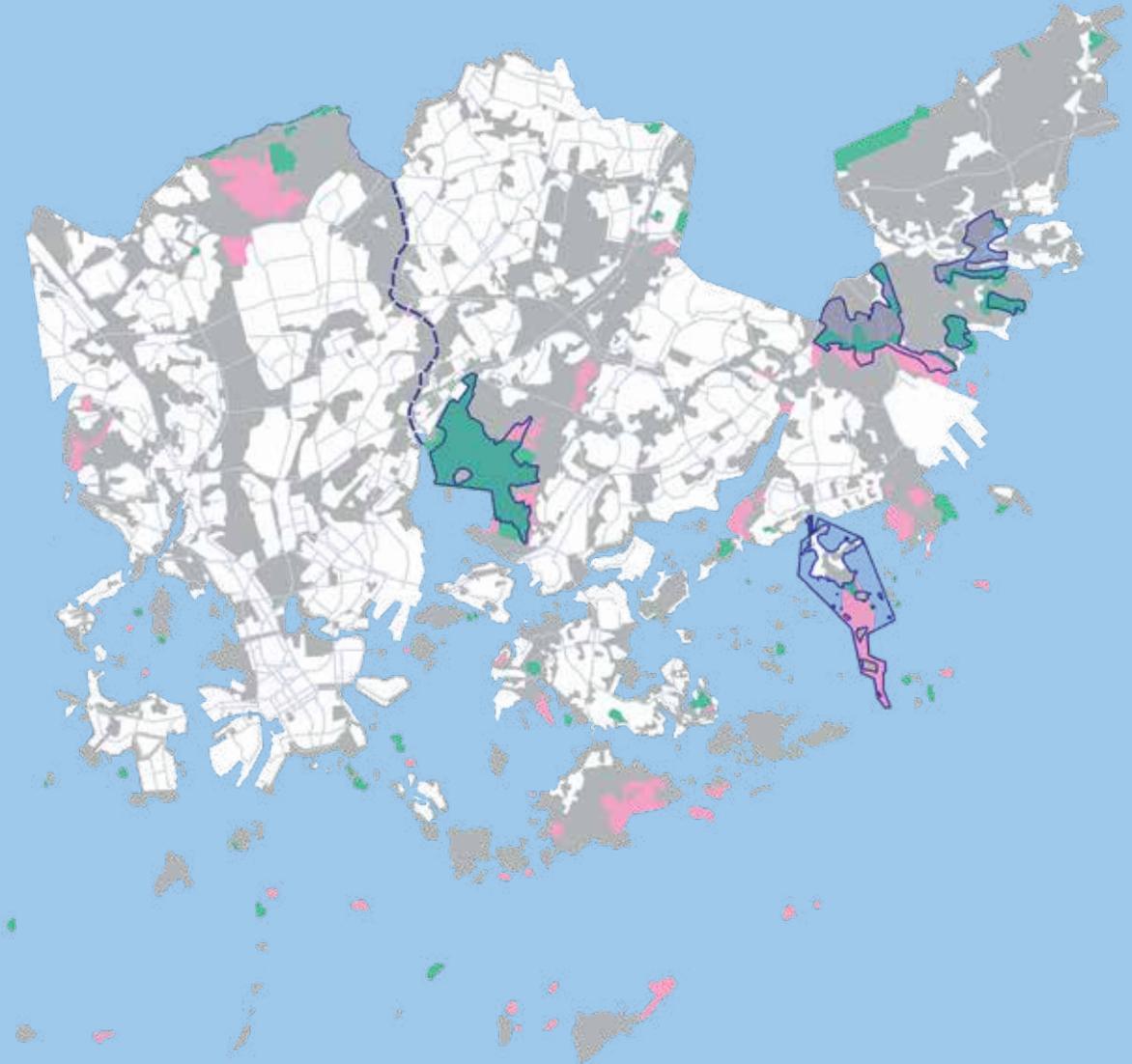
The goals of Helsinki's new implementation programme for the city plan are being implemented to secure sufficient recreational and green zones and to develop maritime areas and urban nature networks. The objectives regarding urban nature and the forest network are presented in Attachment 1 of the City Plan Programme in accordance with the City Strategy, the Nature Conservation Programme 2015–2024 and the Urban Nature Map in the city plan. The forest, meadow and blue networks have been developed. There is also a guide on how to develop the forested and wooded networks as a part of Helsinki's city planning.

Inspections of the green network have been added to land use planning projects, so that the recreational services and ecological networks can be realised and the necessary investments can be prepared for. With the green factor method, objectives related to green construction and storm water can be set for the green construction of blocks in a dense city structure. In the in-progress preliminary study regarding a national city park, existing knowledge of nature has been utilised, among other information.

The development plan for the green and recreational network of Helsinki (VISTRA II) is being applied to city planning and public area planning as source data, for example, via the Paikkatietovipunen geographic data service. VISTRA II stated that the green areas, other public outdoor areas, beaches

Nature Reserves in Helsinki

- Nature reserves
- Nature reserves proposed in the Nature Conservation Programme (2015–2024)
- Natura areas



The map indicates the 55 currently existing nature reserves in Helsinki, the new nature reserves proposed in the Nature Conservation Programme (2015–2024) and the Natura areas. Currently, 2.2 per cent of all land area is nature reserves, as compared to 0.5 per cent of water areas. When including protected nature types, species protection areas, and Natura 2000 areas not protected by the Nature Conservation Act, the total protected area amounts to 3.7 per cent of Helsinki's land area and 1.0 per cent of water areas. The new proposed nature reserves would nearly double the area.

and the archipelago of the densifying City would be developed as a network-like entity that provides diverse ways of relaxing in all the City's neighbourhoods. The VISTRA work is continued with the development of a tool regarding the accessibility of green zones where the accessibility and service pressure of different types of green zones can be defined based on location data. The accessibility and service pressure of the most important recreational services is also being studied.

Guidelines regarding the methods of reviewing ecosystem services were compiled for zone designers and designing consultants. The instructions are supplemented by the background material report on the attention paid to ecosystem services in regional planning. In addition, zone plans have taken catchment area analyses into account; they are a larger area to be considered than the zone plan. In the Pakila-Tuomarinkylä and Mellunkylä-Vartiokylä area plans, the preparation of which was finished in 2018, and the started area plans, such as the Oulunkylä and Maunula plans, green networks, meaning forested and wooded networks and the grove network, and the blue network are defined as the basis for the goals for the area.

The diversity of nature has also been systematically increased in nature management, such as in the Uutela nature management implementation plan for 2018–2027, prepared in 2018. Dead and rotten trees have been left in the forests, both in the ground and as standing dead trees. Thickets have also been left in the forests for animals to take shelter and nest in. Wetlands and the banks of small streams have been preserved as close to their natural state as possible. Valuable natural sites have been defined within the recreational forest areas to increase the diversity of nature. These sites are excluded from maintenance actions, or they are only maintained to secure the natural values in question.

The realisation of the City of Helsinki's Nature Conservation Programme for 2015–2024 was continued. A founding proposal and a maintenance and usage plan were made regarding the nature conservation

area in the Kallahti shallows. An expansion proposal and a new, updated maintenance and usage plan were made for the Maununeva nature conservation area. The plan included both the conservation area founded previously and the new expansion area. A maintenance and usage plan was completed for the Haltialanmetsä nature conservation area. Both Kallahti and Haltialanmetsä are popular recreational areas, which is why the local organisations and residents were heavily involved in the preparation of the maintenance and usage plans.

A kilometre-long, accessible duckboard path and an accessible bird watching platform were constructed. Additionally, mobile websites on ten urban nature sites and mobile nature paths for all ages were produced.

Nature surveys were conducted in Särkkäniemi in Uutela and in three future nature conservation areas in Rudträsk, Uutela forest and Skatanniemi. Nature surveys were also conducted in Hallainvuori. Maintenance and usage plans and founding proposals will be made for these areas based on the nature surveys.

An extended bird population count was held at the Vanhankaupunginlahti Bird Wetlands Natura 2000 area, in which the migratory birds temporarily resting in the area were also taken into account, in addition to nesting birds. When looking at the long-term development, the numbers of pairs and species are on the increase. The fishing efforts to remove the harmful invasive species, the Prussian carp, continued in the 'Moomin pond' of Pornaistenniemi. A survey on invertebrate species was also performed on the pond, in which it was noted that the removal fishing has had a positive effect on the invertebrate population. In 2018, almost 1,000 kilograms of Prussian carps were caught in the pond, meaning 400 kg/ha.

Invasive species control is directed by the invasive species policy and the prioritisation plan for controlling invasive species, according to which efforts were focused on controlling the 25 most harmful species of invasive flora and five species of fauna. In the regional prioritising, the priority fell on nature reserves, endangered habitat types and locations with endangered plant species. Only the Persian hogweed will be completely eradicated from Helsinki, if possible, while efforts are made to keep the other species away from agreed areas. Invasive species control was carried out both by the City itself and as voluntary work in cooperation with the Allergy and Asthma Association of Finland and the 'Healthy Steps into Nature' project of the WWF. Ten voluntary work events were organised by the City, and some events were organised in co-operation with companies, associations and schools. In addition, residents were offered guidance and support to organise voluntary work on their own. The City helped residents when disposing of plant waste, for example.

Green professionals learn about invasive species control in Helsinki with the help of a training package. The package includes instructions in identifying and controlling plant species, as well as information on the plants' characteristics and distribution.

In the EU-funded NATTOURS project, a kilometre-long, accessible duckboard path and an accessible bird watching platform were constructed. Additionally, mobile websites on ten urban nature sites and mobile nature paths for all ages were produced.

There are approximately 150 species

in Helsinki Zoo, 27 per cent of which are endangered, and one of which, the Père David's deer, is extinct in the wild. In 2018, the Zoo received new species, including the African spurred tortoise, the central bearded dragon, the bank vole, the giant forest scorpion, the Rio Cauca caecilian, the Chinese water dragon, the African olive millipede, the Alpine marmot, the prairie dog, the common kestrel and the yak. More than 50 animal babies were born in the Zoo. The Zoo is involved in the seven-year MetsäpeuraLIFE project, the central goal of which is to restore the European forest reindeer to its former habitats. In 2018, all fawns born in the Zoo the previous year were sent to natural 'practice pens' next to Ähtäri Zoo and the Seitsemien National Park to be eventually moved to the wild.

Years of work paid off in the midsummer when two young, female Przewalski's wild horses born in the Zoo were transported to a practice pen in Mongolia. Animals to be transferred to the wild are studied carefully as they need to be genetically suitable, healthy, and, as in the case of wild horses, have good hooves or other physical qualities.

The Helsinki Zoo works in close cooperation with zoo experts and various conservation organisations around the world. The Zoo continued to fund nine protection projects, together with the Friends of Helsinki Zoo Association. The projects support species such as the Pallas's cat, the snow leopard, the bearded vulture and the red panda. Furthermore, funds were collected for returning the wild horses to the wild and supporting the wildlife hospital of the Zoo.



Eyes on the future

The implementation of Helsinki's Nature Conservation Programme will be accelerated, and it will take the goals, actions and schedules of the Maritime Strategy into account. Ways for strengthening the forest network and the other ecological networks will be sought, and instruction will be written for this. A nature monitoring plan will be made by using new information on endangered nature types in Helsinki, for example. Additionally, an accessibility tool for green zones will be taken into use.

Restoration of contaminated soil and landfill sites

The most significant contaminated soil restoration locations managed by the City were the project areas of Kalasatama and Jätkäsaari that were to be transformed into residential use. Extensive restoration sites are located on Kivikontie and in Hakaniemi. In addition to the large projects, several individual small sites were inspected and restored in 2018. Soil was restored at approximately 40 different restoration locations.

The soil restoration was usually done during the other construction work in the areas. The soil condition database created by the Ministry of the Environment features the details of 878 areas in Helsinki where research has shown the soil to be contaminated, where the soil has been assessed as being potentially contaminated or where the soil has been restored.

The restoration of the Vuosaari landfill is underway, and the City is preparing to restore the Iso-Huopalahti landfill in the coming years.

The soil was cleaned in the same way as in previous years, primarily by excavating

the soil containing harmful substances and transporting it elsewhere for appropriate processing. Soil was also restored by isolating the contaminated soil matter on site. Below is an overview of how the contaminated soil matter was transported for treatment or final disposal in Helsinki in 2015–2018. Some of the excavated, contaminated soil matter was utilised in landfilling at construction sites, mainly for the base structures of parks, and in landfill sites.

The costs generated by the restoration of contaminated areas and landfill sites decreased slightly from the last few years. Below are details of the costs caused by the restoration of contaminated soil and landfill sites in 2015–2018.

A total of 92,700 tonnes of contaminated soil was transferred to be processed or disposed of, which is approximately 32 per cent more than last year.

In 2018, 734,800 tonnes of unspoiled excavated earth were used at public construction sites. 122,900 tonnes of unspoiled excavated earth were delivered to external recipients.

Contaminated soil matter transported for treatment or final disposal in Helsinki and the costs for the City of Helsinki caused by the restoration of contaminated soil and landfill sites 2015–2018

	2015	2016	2017	2018
Land, tonnes	180,000	300,000	70,140	92,700
Costs in euros	10,370,000	23,480,000	19,671,000	17,878,000



Procurements

In accordance with the City Strategy, Helsinki will assess how it can direct its procurements to better promote innovative entrepreneurship. The City's environmental policy sets ambitious objectives in terms of making procurements more sustainable. Tendering processes are seen to consider environmental aspects if they are included in the mandatory requirements or in the comparison criteria for the tenders. The challenge will be, in particular, the monitoring of the procurements.

The environmental network for the City of Helsinki procurements aims to increase the internal cooperation in the City and the exchange of information between the parties responsible for the City's procurements. The City has created a guide for sustainable procurements, and the Environmental Services also offer consulting to the divisions on the topic. The consulting services aim to facilitate the setting of environmental criteria in different types of procurements.

To promote sustainable procurements, new goals and actions were set in 2018 in both the Carbon-neutral Helsinki 2035 Action Plan and the division-specific environmental programmes of the Urban Environment Division and the Social Services and Health Care Division. The Urban Environment Division also received a procurement strategy that focuses heavily on sustainable procurements.

In 2018, the City's procurements of bread, meat, fish, margarine and frozen pastries were developed, among other things. Criteria were set particularly regarding animal welfare, sustainably sourced palm oil, low-emission transport fleet and employment. In addition, environmental and emission-related criteria for passenger and freight transport services done with a passenger car or a van were developed in co-operation with the rest of the Metropol-

itan Area, and a market survey for operators in this sector was conducted.

Helsinki has had an active role in regional and national co-operation. For example, the City joined the low-carbon construction developer group facilitated by KEINO, the competence network centre for sustainable and innovative public procurements.

Helsinki has had an active role in regional and national co-operation.

The City also continued its involvement in international co-operation on sustainable procurements, such as the Global Lead City Network on Sustainable Procurement (GLCN) and the Procura+ network. In 2018, Deputy Mayor Anni Sinnemäki was selected as the Vice-president of Procura+.

In 2018, City divisions, public enterprises and departments took the following environmental aspects into account when making procurements:

- Waste sorting and waste reduction
- Low emissions
- Environmental management system or similar
- Energy efficiency
- Material efficiency
- Criteria of environmental labels
- Lifecycle costs

2018 was the fifth anniversary of Helsinki being named a Fairtrade city. This title means that Helsinki is committed to promoting Fairtrade and make ethical choices in its procurements. In 2018, the City of Helsinki Service Centre used 2,974 kg and Palmia Oy 28,538 kg of Fairtrade products. The largest product groups were coffee, tofu and sugar.

In the food services, sustainable and responsible choices of ingredients are key when reducing environmental impact. The Service Centre offers food made of seasonal ingredients, and all menus include a vegetarian option every day. Schools and day care centres have a weekly vegetarian day. In fish procurements, the City adheres to the guidelines of the WWF and procures as much Finnish, sustainably sourced fish as possible. For foreign fish produce, the focus is also on MSC certified, sustainably sourced fish.

The food delivery entity, for which the Service Centre held a bidding competition in 2018, made it to the finals of the Best Procurement of the Year competition of the Public Procurement Counselling Unit of the Association of Finnish Local and Regional Authorities. The logistics of the food services involve an extensive procurement process, which, according to the jury, paid attention to the critical importance of the services for customers, focused on research prior to the procurement process and secured operation during the contract term with strict conditions. In connection with the bidding competitions, the price structure was reformed and the environmental criteria for the vehicle fleet were made stricter. With new delivery agreements, the calculated emissions from food deliveries decreased significantly: carbon monoxide emissions decreased by 22 per cent, nitrogen oxide emissions decreased by 67 per cent and particle emissions

decreased by 92 per cent compared to the previous fleet. At the same time, cost savings of 25 per cent were also achieved compared to the previous agreements.

The framework agreement arrangement of the City's electricity purchases came into force 1 January 2018. Framework agreements on electricity purchases and electricity portfolio services will be valid until the end of 2021. The adoption of both options in the agreement was confirmed in December 2018. The agreement on electricity portfolio services includes the purchase of green electricity. Each procuring unit procures electricity produced with renewable energy in each delivery year in the extent defined. The portfolio manager implements the procurements on the market. The electricity used by HKL for operating transport connections is Nordic hydro or wind power.

In premise and infrastructure construction projects, it is obligatory to take environmental matters into account (in the project plan), and the contractor must create an environmental plan on the management of environmental matters at the construction site. For housing and infrastructure projects, a commercial environmental document has been prepared for environmental management, which was piloted in 2017 and 2018. The environmental document was used in three infrastructure projects and in one housing construction project in 2018. The environmental document will be integrated into other documents for steering construction.



Eyes on the future

The strategic management and lifecycle approach to procurements must be developed so that effective low-emission solutions will be easier. Goals related to the climate, the environment and sustainability must be systematically integrated into all procurements of the City. The competencies of procurers need to be improved as well.



Circular economy

As stated in the City Strategy, the goal for 2017–2021 is that emissions reductions and circular economy projects will be implemented in Helsinki in cooperation with the corporate world and residents. Helsinki wants to function more and more actively as a platform for interesting and profitable innovations that will also create new export

Thanks to reusing of excavated earth, 4.5 million euros was saved.

opportunities. Of the 147 actions in the Carbon-neutral Helsinki 2035 Action Plan, 14 are related to the circular economy. The topics of these actions include increasing climate and circular economy know-how, reducing and reusing food waste, encouraging people to reuse products and promoting sharing economy. In addition, one action involves a roadmap for circular and sharing economy.

In 2018, the Environmental Services implemented project that surveyed the processing and recycling rate of City furniture and IT systems, actions taken to combat food waste and biomass flows in the City. The results of the survey will be partially used in work on the circular and sharing economy roadmap starting in 2019. In addition, the survey on the City's recycling of furniture supports the work on reusing and recycling furniture within the City. For this purpose, a recycling network for furniture was founded in 2018, consisting of representatives of various City actors. In 2018, the network prepared instructions for the City for processing unused furniture and assets, and studies the adoption of an electronic platform for recycling furniture.

Circular economy is becoming significant

in construction as well. In Helsinki, this has been seen in the systematic coordination of surplus landmasses in construction in the last few years. The work group coordinating the landmasses drafted the principles of landmass control and an action plan in 2018. These also cover demolition waste. The action plan will progress to the Urban Environment Committee in 2019.

Coordinated management and utilisation of excavated earth reduced transportation and the resulting emissions. In 2018, a total of 734,800 tonnes of excavated earth mass and rock material was used in the construction of public areas. Thanks to reusing, ca. 4.5 million euros and 840,000 litres of fuel were saved and emissions were reduced by 2,093 t CO₂e. The most noteworthy location for landmasses is the restoration site at the old Vuosaari landfill.

A condition for circular economy is that the area has sufficient locations where masses can be stored and processed. The City has seven recycling sites where crushed rock, excavated earth, demolition materials and contaminated soil are temporarily stored and processed in accordance with environmental permits. Additionally, asphalt, concrete and brick waste are crushed and dredged sediment dried at the sites. At the end of 2018, mass stored at the sites totalled 1.5 million m³.

In 2018, the Urban Environment Division used 99,000 tonnes of hot-mixed asphalts for street surfaces. 43 per cent of recycled asphalt was used, out of which 50 or 70 per cent was crushed asphalt.

The City of Helsinki has participated, together with Vantaa and Hämeenlinna, in the RANTA project of Green Net Finland. The goal is to develop procurement criteria for demolition projects that promote circular economy, survey current bottlenecks and obstacles and study the field and business opportunities in demolition waste and reus-

Challenges and solutions of circular economy procurements have been collected by interviewing 30 people working in the value chain of construction, both within and outside the City organisation.

able parts. Helsinki has its own demolition site in Hernematala for the purposes of the project. The RANTA project was implemented in 11/2016 – 01/2019.

Helsinki promotes circular and sharing economy in an urban context together with seven European partners in the Climate-KIC Circular Cities project funded by EIT. The project started in autumn 2018, and it is planned to continue until the end of 2019. The project is implemented by Malmö (main partners), Climate-KIC Nordic, Helsinki, Copenhagen, C40, Veolia, Clean Tech Bulgaria and University of Aarhus. The project also has six follower cities in total.

In the project, the City of Helsinki focuses on the obstacles and opportunities of circular economy procurements in construction. The goal of the work is to present real construction projects with successful circular economy procurements. In addition, the project aims to remove the obstacles of circular economy procurements, for example by reviewing existing circular economy materials with the KEINO competence centre. Challenges and solutions have been collected by interviewing 30 people working in the value chain of construction, both within and outside the City organisation.

The first product of Circular Cities, the report by the C40 network regarding ambitious city-led circular economy projects, was published in December at the UN's climate conference in Katowice, Poland. The first Master Class of the project gathered 70 participants from 12 European cities and organisations such as ECD, UNDP, EBRD and EIB in Sofia, Bulgaria in February 2019. During the two-day event, workshops were

used to discuss circular economy opportunities for cities and public utility companies.

In the other EIT-funded project, Climate-KIC Circular Economic Learning Center, two such centres were founded, one in Kalasatama and one in Segepark, Malmö. In Kalasatama, participants focused on accelerating and scaling sharing economy solutions. The greatest problem for sharing economy services is a lack of awareness, even though services have been successfully piloted. This problem was discussed with the sharing economy companies which had participated in the quick trials in Smart Kalasatama. Two workshops were organised in the project to develop the co-operation of companies and to make the scaling of successful sharing economy solutions easier. The participants were Tolotech, Parkkisähhö, Kliffa Innovations, Rollock, Flextila, Witrafi, Coreorient and Iloq. The workshops were organised together with Forum Virium Helsinki and Ethica. The project was active in Helsinki in late 2018 and early 2019.

In Kalasatama, a flexible space, Urban Lab, was opened in November 2018. The City, companies and residents can develop the City together in the Lab, and it can be rented by interest groups using the Flexitila service. The space can be accessed through smart locking with a single-use personal code. The use of the space is facilitated by developing new services and solutions connected to self-service. The space has become more flexible as its furniture is procured from Martela as a service: the interior furniture can be changed according to your needs or the those of your event. At a city level, shared spaces increased the utilisation

rate of premises and decrease the need to construct new spaces. Flexi-spaces can also support hobby opportunities close to residential areas, in which case the need for transport decreased.

The Service Centre aims to prevent food waste by monitoring consumption, using methods that reduce food waste and through campaigns. For example, during the Food Waste Week, schoolchildren were challenged to think about how daily food waste could be reduced through everyone's own actions. In food waste management, some locations tried the Lunchie app, with which surplus food can be sold to customers inexpensively.

In autumn 2018, the Environmental Services surveyed the quality, volume and reuse possibilities for the City's own organic

surplus materials. More effective reusing of various organic biomass flows has been identified as a significant action in Helsinki when aiming at carbon-neutrality. In the survey, the City's food services, forest, field and green area maintenance and animal care in the Zoo and the Haltiala farm were named as essential actors. Sewage management is primarily the responsibility of HSY, which is why it was excluded from the survey.

The surveyed biomasses proved relatively small. It would be necessary to carry out a more extensive, regional and logistic study into biomass flows as soon as possible. This more extensive survey should include the other operators in the region, such as companies, in addition to the City. The reuse of organic biomass flows has potential for new innovation and business.



Eyes on the future

The greatest circular economy opportunities in Helsinki are in construction, circular economy and sustainable biological cycles in the food chain and energy production. The circular economy aspect should be taken into account when planning areas. In construction, moving on to circular economy enables the reduction of both lifecycle emissions and the use of virgin natural materials. In construction, essential materials are steel, aluminium, concrete and plastic, in particular. The challenges of circular economy include the low availability of reused and recycled materials on a large scale, especially in the housing and office building sectors. The awareness and knowledge of both City employees and residents need to be increased, and circular economy needs to be considered more in procurements.

Environmental awareness and responsibility

The Environmental Youth Work Unit offered thousands of young people the chance to go camping at its camping areas close to nature. The camping trips were organised by associations and youth centres. The nature school and adventure-education activities of the unit also reached a great number of young people. In November 2018, a Youth Environment Space was opened. Young people participated in the design of

In 2018, 33 nature trips were organised, with 1,300 residents participating.

the space. The space is in the new Laajasalo shopping centre, and it offers services to all Helsinki residents. The operations of the Environment Space are developed together with young people, and it meets the environmental activity needs that have arisen in the youth influencing system Ruuti. The activities include an eco-café, animal activities, nature trips and environmental influencing. The sustainability of the entire unit was increased throughout, and the unit received the EcoCompass certificate in June.

During the autumn, a model was developed with the intention of spreading EcoCompass work into the entire youth service. Young people are also offered environmental activities in other youth service units and operations, such as the Fallkulla Domestic Animal Farm, the Kumpula School Vegetable Farm, the Edible Park and the Luuppi Stone Workshop and many local youth centres.

The Arkki Nature School of Helsinki Zoo

organised 46 schooldays for pupils from 3rd to 6th grade. The curriculum emphasises learning environments outside schools, which has further increased the demand for Nature Schools. The operations of the Nature Schools involved plenty of other educational activities, such as the Student Conference, a Zoo day for schools and four environment- and animal-themed children's summer camps.

In the Harakka Nature Centre, 94 nature school days were organised for Helsinki schools, 45 of which were nature study days for lower stages, while 49 were environment study days for upper stages and upper secondary schools. For children in day care, 66 island adventure days were organised, and island adventure trips for families with children were organised on seven summer Sundays. During the summer season, Harakka organised guided island tours every Sunday, and 43 on-demand tours were also organised. On Helsinki Day, transport to the island was free of charge, and an event on the wonderful world of plants was held. Two camps were organised: an archipelago camp for children and an international Gulf of Finland camp for teachers and youth. For educators, 8 environmental education courses were held. Of these courses, the Helsinki's Wonderful Nature as a Learning Environment course had more applicants than what the course had room for.

In 2018, 33 nature trips were organised, with 1,300 residents participating. The most popular trips were the summer trip to Mustavuori, Summer Night's Dreams and Scents in Uutela, the Natural Flower Day trip to Seurasaari (can you find an arctic



- 21,000 residents participated in the spring cleaning event
- Helen donated more than 70 condition sensors to libraries for the residents to borrow
- In the Energy Expert courses for the Metropolitan Area, organised by Ilmastoinfo, 60 Energy Experts graduated, ready to improve energy efficiency in housing companies
- Adults and children participated in urban farming at many playgrounds and day care centres
- The materials of the 'Hei, kaikki toimii (Hey, everything works)' campaign for Helsinki pupils in the 2nd grade were supplied to more than 1,500 pupils
- HSY's Twin School Programme offered two alternative themes: Vital water and Sustainable consumption In the school year of 2017–2018, six Helsinki schools participated and in 2018–2019, five schools participated



starflower?) and the whole family's marine biology trip on the island of Harakka.

In October 2018, the My2050 experience game on climate change was launched at Kansalaistori Square and its vicinity. In this mobile game, players adventure in an authentic urban environment and solve challenges related to the life of Niha, living in the 2050s, and climate change. The game is a new kind of tool for phenomena-based learning, from sixth-graders to students in upper secondary schools. The game is open and free for all, and it was implemented with the support of Visia GameFactory's partners: HKL, Helen, HSY, HSL, City of Helsinki, Tradeka and Observis.

Helen Ltd encourages citizens to save energy. During 2018, Helen talked about energy, its smart use and the energy industry at Energiatori and power plants to 3,500 people. Helen was involved in the Business Village, intended to teach sixth-graders about innovative society, economy and working life, for the sixth year in a row. During the Business Village day, each student practises an occupation for the entire day. At Helen's booth, students learned about the role of energy companies in society, as well as about energy conservation.

The 'solar power to homes' service and campaign created by Ilmastoinfo were made national and transferred to Motiva (www.aurinkosahkoakotiin.fi). In Helsinki, a solar power info event was organised as a part of the campaign. The info events on charging electric cars had 570 visitors. The events were organised together with Kiinteistöliitto Uusimaa. The From Oil to Renewables campaign was started with a questionnaire about house-owners' desire to use more renewable energy in heating. Two case studies were made on the changes to the residents' heating habits. In addition, an

extensive energy survey was carried on an apartment building built in 1968 regarding energy actions in connection to a pipeline renovation. The results of the survey were presented at various events.

In May, the new climate training service Ilmastotreeni was launched, in which personal trainers help people make environmentally friendly choices. The service was presented at the World Village Festival, the Helsinki Baltic Herring Market and the I love me exhibition, and also to the staff of NCC, HUS and Posti. Mayor Vapaavuori also participated in the training via a video. Almost 1,800 training newsletters were subscribed to.

The electric bike testing campaign received more than 900 applications, and four families were selected for the month-long pilot. In addition to the two-week pilot at the Zoo, electric cycling was promoted at various testing events, and cyclists were thanked with a cycling breakfast in Oulunkylä.

HSY actively communicated with residents in 2018 through the 'Thank you for sorting your waste' theme, with the aim of inspiring households to sort their waste. HSY also encouraged people to reduce the amount of waste. In addition to online communications, campaigns and events, HSY also organised many info events and lectures on circular economy for resident groups, schools and day care centres, public administration and other customers.

In 2018, Environmental Services started a project to study the environmental awareness of immigrants. In addition, the environment-related services offered to immigrants by various actors will also be studied. The purpose is to get a clear picture of the field and to share environment-related content with immigrants both on the City's website and as distributable materials.

Environmental risks

Due to climate change, extreme weather conditions will increase and forecasting will become more difficult. Invasive species also cause harm, and the risk of an oil incident at the Baltic Sea is great. From the City's perspective, the most significant environmental risks are fires, oil and chemical spills, soil and water contamination, deterioration of air quality, diminishing biodiversity, disruptions in the railway network, and the challenges posed by extreme weather phenomena to healthcare, in particular. Preparing for these risks is done through organised actions.

Since 2014 the Zoo's vet has acted as the WWF's Chief Veterinarian in regard to oil spills. In 2018, two oil spill response exercises were organised in Helsinki Zoo in cooperation with the WWF, the Helsinki City Rescue Department, the Finnish Environment Institute and Metsähallitus. The Rescue Department complemented its oil spill response equipment with two B-class oil spill response boats. The boats are used in oil spill response 50 per cent of the time.

Several incidents that lead to suspicion of environmental offences occur in Helsinki every year. The range of offences is wide, and environmental offences often also constitute financial offences when the offences are committed for financial gain, for example by neglecting waste management costs or investments that are significant in terms of environmental protection. For an incident to meet the essential elements of an environmental offence, the environment does not

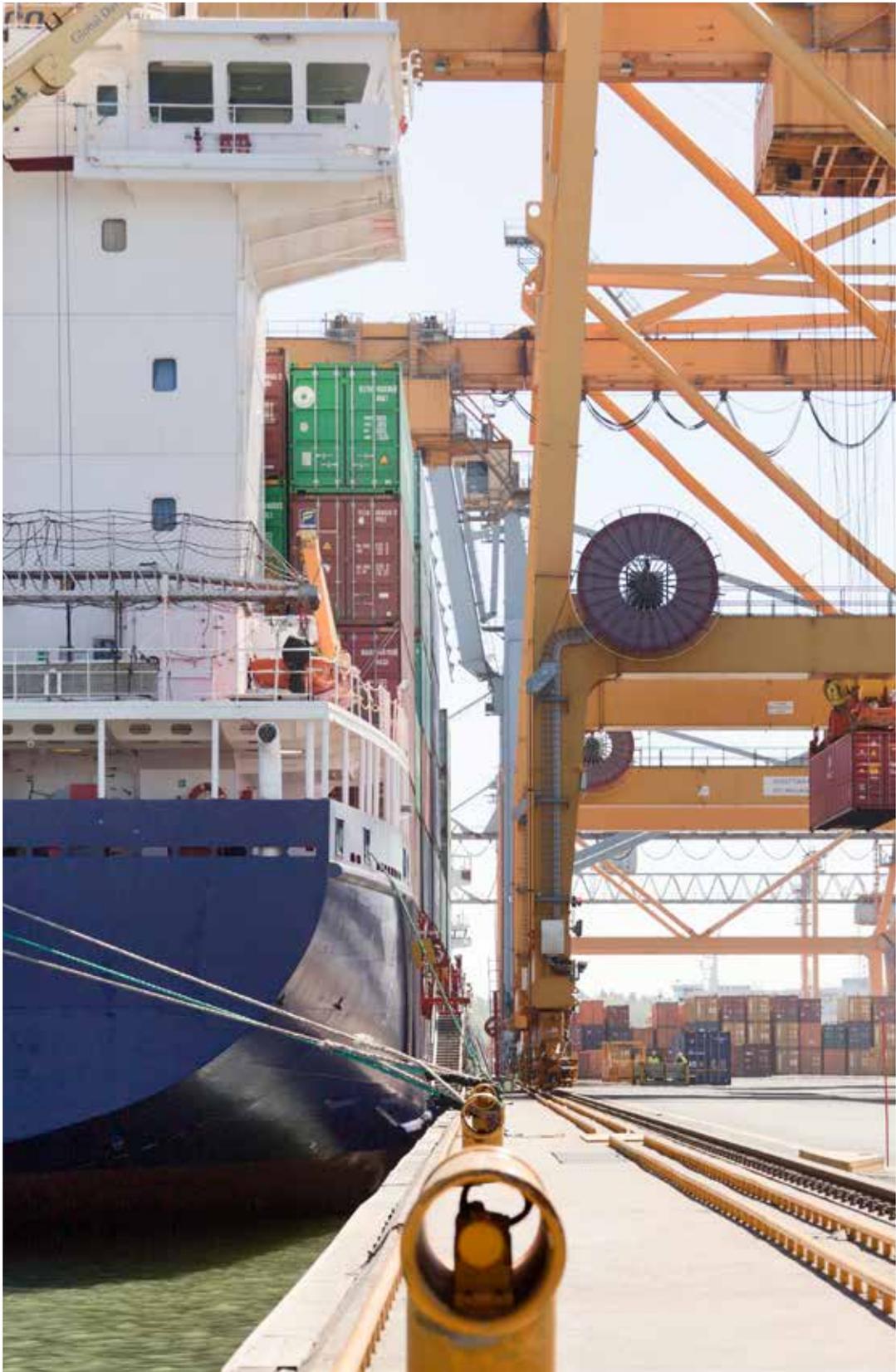
need to be damaged; instead, the threat of damaging the environment is punishable in itself.

The national strategy for preventing environmental offences is implemented in Helsinki through close collaboration between environmental supervision authorities and the police, for instance. Other environmental monitoring authorities co-operating with the Helsinki's Environmental Supervision include the Regional State Administrative Agency of Southern Finland, Uusimaa Centre for Economic Development, Transport and the Environment, the Finnish Environment Institute, the Customs, the Tax Administration and the Prosecutor's Office of Helsinki.

The two-year training programme for environmental offences prevention of the Police University College ended in 2018. The environmental inspectors dealing with environmental offences participated in the training, along with the environmental offences investigator of the Helsinki Police Department. The training provided both parties with good abilities to take both environmental matters and the methods of preliminary investigation, as well as the requirements for prosecution and conviction, into account from the start. In spring 2018, the police investigators working with environmental offences were on rotation at the City's environmental services and participated in the work of environmental inspectors in practice.

Oil spills in Helsinki

	2015	2016	2017	2018
In water bodies	39	31	75	13
In important groundwater basins	2	10	11	11
In other areas	317	303	278	366
Total	358	344	364	390



Environmental economy

Environmental economy includes the income, costs and investments made primarily for environmental reasons. The information is presented for the parent organisation, meaning the divisions, public enterprises and departments.

The environmental costs, including amortisations, added up to a total of 91 million euros (+2% from 2017). The environmental costs made up 2.1 per cent of the City's total operating costs, equalling 139 euros per capita. The City's largest expense items were the costs of climate protection (33%), sanitation and waste management of the areas (23%), and promoting climate-friendly and environmentally friendly transport (18%).

The environmental investments added up to 135 million euros, which was 21.5 per cent of the total capital expenditure of the City and 207 euros per capita. The City's environmental investments remained at the same level as the previous year, and the largest investments were related to promoting climate and environmentally friendly transport (HKL's fleet acquisitions) and soil decontamination.

The internal environmental income added up to some 6 million euros, which made up 0.5 per cent of the total operating income of the City and 9 euros per capita. Environmental income decreased significantly, since the Helsinki Zoo, the proceeds of which have formed the majority of the environmental income, is no longer part of the parent organisation.

The value of environmental responsibilities in the financial statements on 31 December 2018 was 22.4 million euros. The responsibilities concerned preparing for the restoration of old landfills and decontaminating soil.

Environmental income*

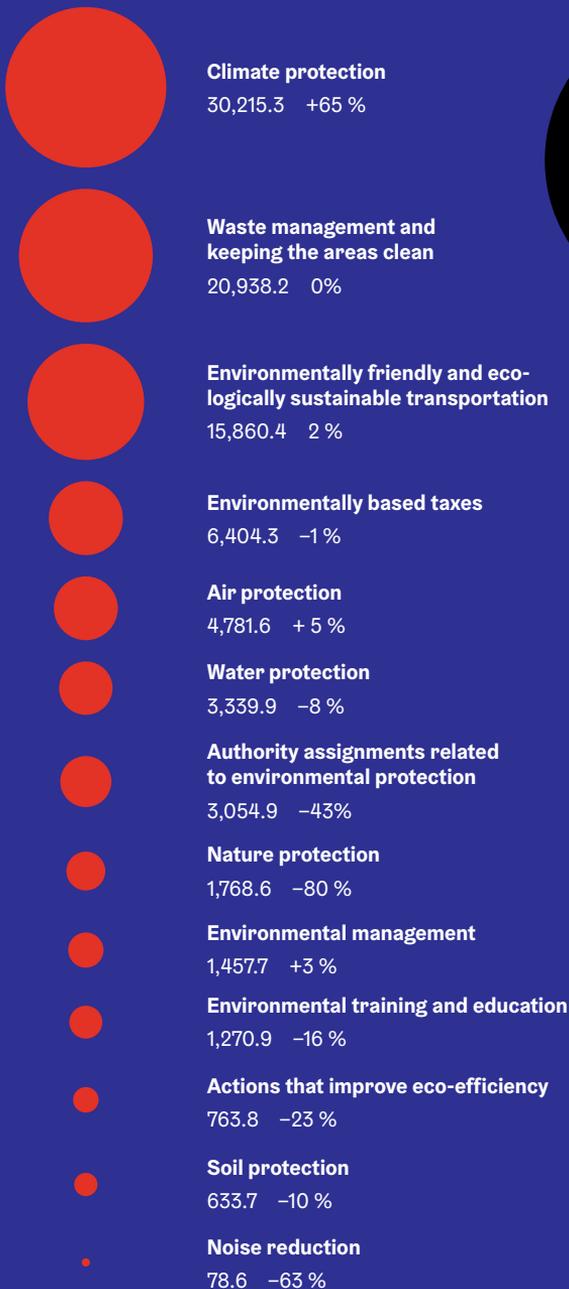
6,035,942 euros



* In the city organisation in 2018, thousand euros,
The change from the previous year is expressed as a percentage

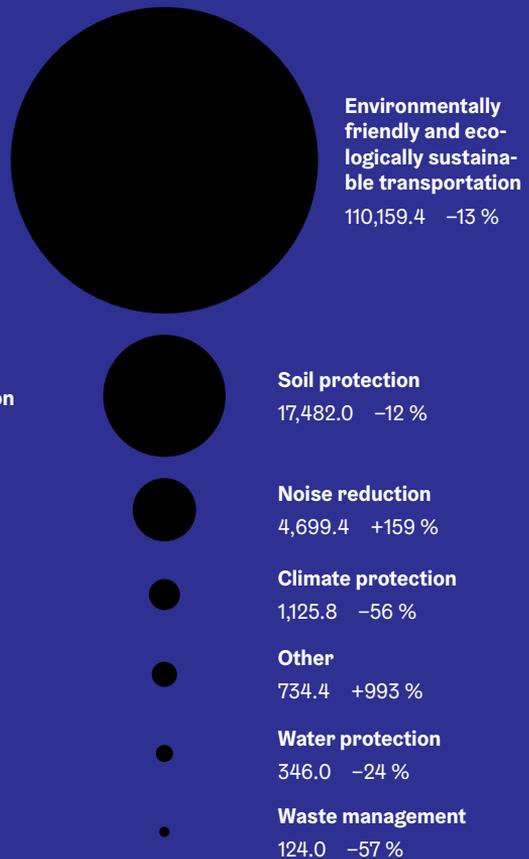
Environmental costs*

90,567,742 euroa



Environmental investments*

134,680,109 euroa



Indicators

- The objective is reached or is about to be reached
- The realisation of the objective is proceeding
- It is challenging to reach the objective

Indicators for environmental management and partnerships

Objective

The share of administrative branches (out of all administrative branches) that carry out environmental management at least in accordance with the criteria for streamlined environmental systems will be 100 % by 2020 (environmental policy)	58%	●
Number of administrative branches (of administrative branches that use bonus schemes) where environmental management is part of the bonus scheme will be 100 % by 2020 (environmental policy)	25%	●
The combined number of audited EcoCompass companies, Climate Partners companies and organisations that have accepted the Baltic Sea Challenge will increase (environmental policy)	467 pieces	●

Indicators for climate change mitigation

Objective

Greenhouse gas emissions in the Helsinki region to fall by 30% from the 1990 level by 2020 (Strategy Programme 2013–2016) and by 60% by 2030. Helsinki to be carbon-neutral by 2035 (Strategy Programme 2017–2021)	-27%	2020: ● 2030: ● 2035: ●
Per capita greenhouse gas emissions in the Helsinki region to fall by 39% from the 1990 level by 2030 (Helsinki Metropolitan Area Climate Strategy)	-45%	●
Greenhouse gas emissions from energy production to fall by 20% from the 1990 level by 2020 (Strategy Programme 2013–2016) and by 40% by 2025 (Helen's Development Programme)	-3%	2020: ● 2025: ●
Energy consumption per capita in the Helsinki area to fall by 20% from the 2005 level by 2020 (Environmental Policy)	-16%	●
Renewable energy in the urban area to account for at least 20% of total energy production by 2020 (Environmental Policy)	22%	●
The proportion of renewable energy of energy production to reach 20% by 2020 (Strategy Programme 2013–2016) and 25% by 2025 (Helen's development programme)	12%	2020: ● 2025: ●
Energy savings in the City's own operations (public buildings, vehicles, street lights): 61 GWh (KETS 2017–2025)	9 GWh (15% of the objective)	●
Energy savings of City-owned residential buildings: 55.7 GWh (VAETS 2017–2025)	4 GWh (7% of the objective)	●

Indicators for air protection

Objective

Annual average nitrogen dioxide concentration on the Mannerheimintie monitoring station will not exceed 40 mikrog/m ³ (EU directive)	28 µg/m ³	●
Annual average nitrogen dioxide concentration on the Mäkeläncatu monitoring station will not exceed 40 mikrog/m ³ (EU directive)	32 µg/m ³	●
Number of days when the limit value level of particulate matter exceeds on the Mannerheimintie monitoring station will be max 35 days per year (EU directive)	15 pcs/a	●
Number of days when the limit value level of particulate matter exceeds on the Mäkeläncatu monitoring station will be max 35 days per year (EU directive)	20 pcs/a	●

Indicators for noise reduction

Objective

Noise barriers to protect current land use will be constructed as presented in the operating plan	1,746 m	●
Anti-noise coating will be used as presented in the noise operating plan	1,200 m	●

Indicators for traffic

Objective

The proportion of sustainable modes of transport to increase (City Strategy 2017–2021)	80%	●
The number of public transportation trips will increase (strategy programme 2013-2016)	322 trips/resident/a	●
The carbon dioxide emissions of road traffic in Helsinki to decrease by 20% from 1990 to 2030 (Helsinki Metropolitan Area Climate Strategy). Greenhouse gas emissions to decrease by 69% by 2035 (Carbon-neutral Helsinki 2035)	-9%	●
Carbon dioxide emissions of passenger cars registered for the first time in Helsinki will reach the objective for average emissions 95 gCO ₂ /km by 2020 (EU regulation)	114,6 g CO ₂ /km	●
Share of cycling as a transport mode will be 15 % by 2020 (the Brussels Convention 2009)	11%	●

Indicators for water protection

Objective

Nitrogen emissions to the sea from the Viikinmäki waste water treatment plan will reduce (t/a) (environmental policy)	454 t/a	●
Phosphorous emissions to the sea from the Viikinmäki waste water treatment plant will be reduced (t/a) (environmental policy)	15 t/a	●
Number of combined sewer network overflows will reduce 20 % from the current level by 2020 (environmental policy)	-68%	●
Number of trained oil spill response personnel will reach a level, where the city will have a sufficient number of trained people for beach clean-up operations	840 persons*	●

* The city's focus point in oil prevention is at the sea and most of the oil prevention patrols trained thus far were trained for marine operations. The objective is to train 340 officers and petty officers for cleaning the shores, who will lead the companies of coastal cleaning organisation. The cleaning staff will be trained by the officers and petty officers of each company after an oil spill has occurred, immediately after the companies have been established. All in all, the objective is to train 1,000 persons for oil prevention at sea and on the coast. The training has already started for 840 people.

Indicators for nature protection

Objective

Share of nature reserves of total area (City of Helsinki Nature Conservation Programme 2008–2017)	2.2%	●
The surface area of water-permeable areas in Helsinki (the urban run-off water strategy for the City of Helsinki)	60% (2015)	●

Indicators for procurements and waste

Objective

Share of environmental criteria in the centralized acquisitions of the City of Helsinki will be 50 % by 2015 and 100 % by 2020 (environmental policy)	62.5%	●
Amount of communal waste produced in the Helsinki metropolitan area per capita will reduce 10% by 2020 (environmental policy)	313 kg/resident/a (2016)	●

Indicators for environmental awareness

Objective

The number of eco-supporters in the city organisation will increase, so that every work community will have a dedicated eco-supporter (environmental policy)	1,337 eco-supporters	●
The share of citizens who have taken part in the environmental education events and climate and energy guidance provided by the city will increase, so that the environmental awareness of city personnel and citizens will be improved (environmental policy)	25%	●



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