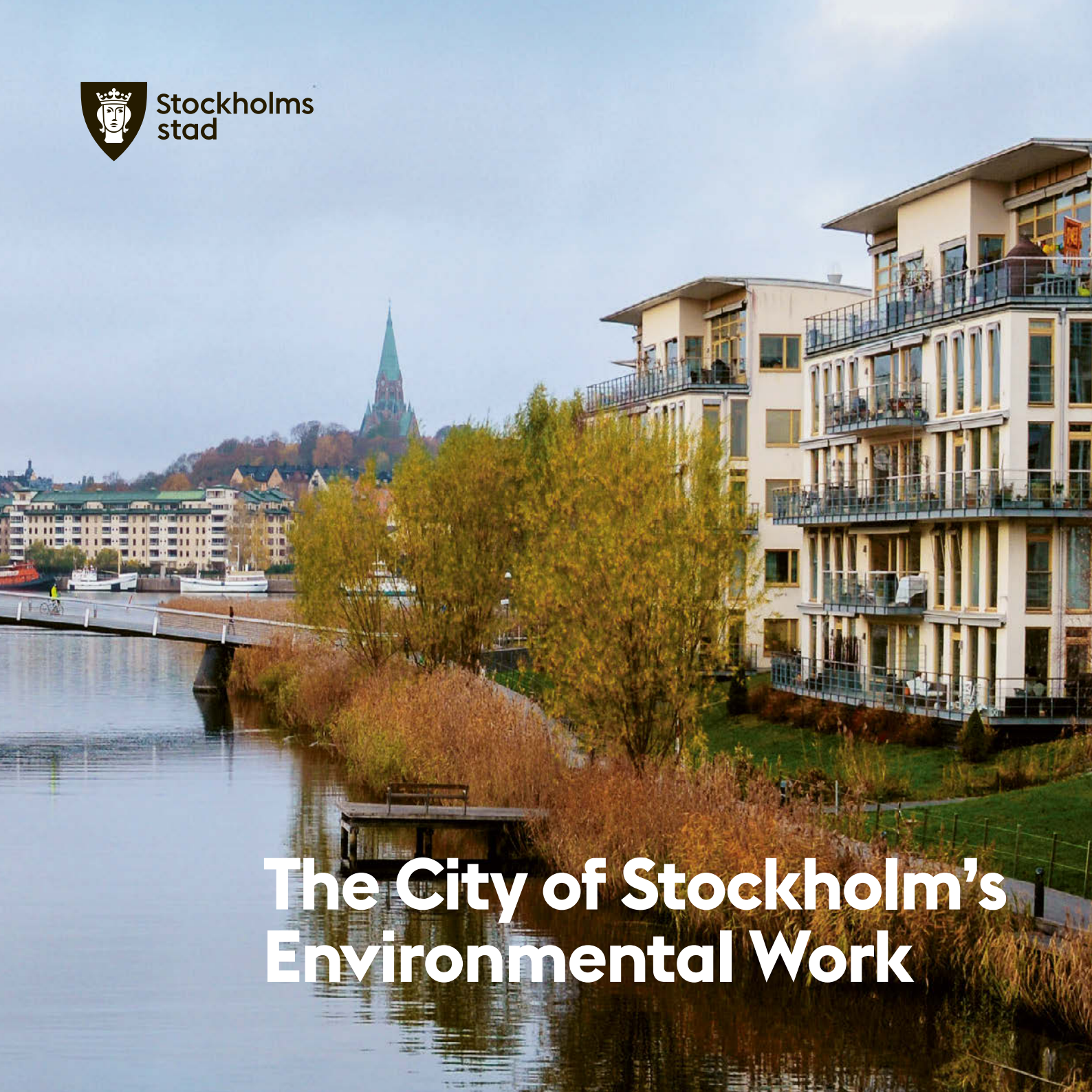




Stockholms
stad



The City of Stockholm's Environmental Work



Foreword

Stockholm is one of the leading green cities in Europe and has long pursued dedicated and award-winning environmental initiatives. The city was named Europe's first green capital in 2010 and Sweden's climate city in the WWF's Earth Hour Challenge 2014. Stockholm is often praised for its beautiful water environments and highly diverse green spaces and parks. These awards have been made possible by structured and ambitious work with environmental issues since the 1970s.

Parallel to this, the city faces challenges in achieving its vision of an ecologically sustainable Stockholm. These involve, for example, reducing emissions to water and air, lessening the city's climate impact and spread of environmental pollutants, strengthening the city's green infrastructure and restoring polluted land and water areas. In a growing city, it is important to take a long-term approach with non-polluting and climate-smart construction and green and climate-smart means of urban transport for both people and goods.

Our vision is for Stockholm to be a sustainable city. Stockholm can and will be a leader in reducing people's environmental and climate impact and having a globally sustainable ecological footprint. This demands continued long-term and determined efforts to develop a city that is as good for future generations as it is for us today, which is something that I as Vice Mayor of Environment strive for each and every day.



Katarina Luhr
Vice Mayor of Environment



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80%

of Stockholm's total heating needs are met
by district heating.

Climate

Greenhouse gases

Stockholm works ambitiously to reduce greenhouse gas emissions. The long-term climate goal is for Stockholm to be fossil fuel-free by 2040.

In 2009, the city decided that greenhouse gases were not to exceed 3.0 tonnes per inhabitant by 2015. This goal was more than met: Stockholm achieved 2.5 tonnes per inhabitant. This is a reduction of about 55 percent compared to 1990. Stockholm is now well on the way to reaching the climate goal for 2020 of 2.3 tonnes of greenhouse gases per inhabitant. This reduction is due to both a reduction in total greenhouse gas emissions and a population increase of 275,000 inhabitants since 1990.

The goal includes emissions from heating, transportation and electricity and gas use within the City of Stockholm's municipal borders, but does not include its inhabitants' consumption and travel outside the city limits.

Success factors

The most important success factors are an increased share of district heating, more biofuels, improved vehicles and energy savings in buildings.

The City of Stockholm does the following to reduce its greenhouse gas emissions:

- District heating with expanded district heating network and increased share of biofuel.
- Congestion charge and more green cars for reduced and greener travel by car.
- Expanded public transport with renewable fuels and investments in more and improved cycle paths.
- Information to and communication with Stockholmers on climate-smart living.
- Collaboration between the City of Stockholm and trade and industry with the aim of joining forces to reduce climate impact.
- Densification of the city with energy-effective development.

District heating

One of the measures that has had the greatest effect on the reduction of greenhouse gas emissions is the expanded district heating network. Increasing numbers of buildings are having their oil and gas-fired boilers replaced with district heating and an increased share of biofuel in district heating production has also helped matters. Today, district heating is produced using about 80 percent renewable fuels, as well as energy from waste and waste heat.



In the space of ten years, greenhouse gas emissions from heating, transportation and electricity use have fallen from 5.6 tonnes to 2.5 tonnes per inhabitant.

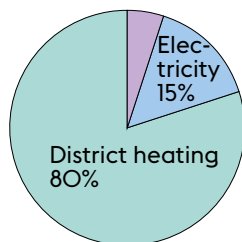


1.3

million kWh is the estimated amount of energy produced by the solar cells each year.

Energy

The energy supply in Stockholm is based increasingly on renewable energy. A full 80 percent of heating needs are covered by district heating and 15 percent by electricity. Over 35 percent of single-family houses in Stockholm have their own borehole heat exchanger. Since 2012, the City of Stockholm has reduced its own energy use by 11 percent despite an increasing population, and this is to be reduced a further 10 percent by 2020.



Electricity

Sweden's electricity production is largely comprised of hydroelectric and nuclear power. Together, they represent 81 percent of total electricity production. The remainder is produced using cogeneration plants, condensing plants, wind turbines and other means.

Värtaverket

2016 saw the inauguration of the new Värtaverket – the world's largest bio-fired cogeneration plant in an urban environment. The plant utilises waste products from the forestry industry and has an annual production capacity of 750 GWh of electricity and 1,700 GWh of heat, which is enough to heat 190,000 apartments. The new plant will further contribute to a reduction in greenhouse gas emissions in Stockholm.

Solar cells

The City of Stockholm has installed about 13,500 square metres of solar cells, primarily on rooftops in the city. These solar cells are estimated to produce 1.3 million kWh each year and the electricity produced is used by the city's own buildings.

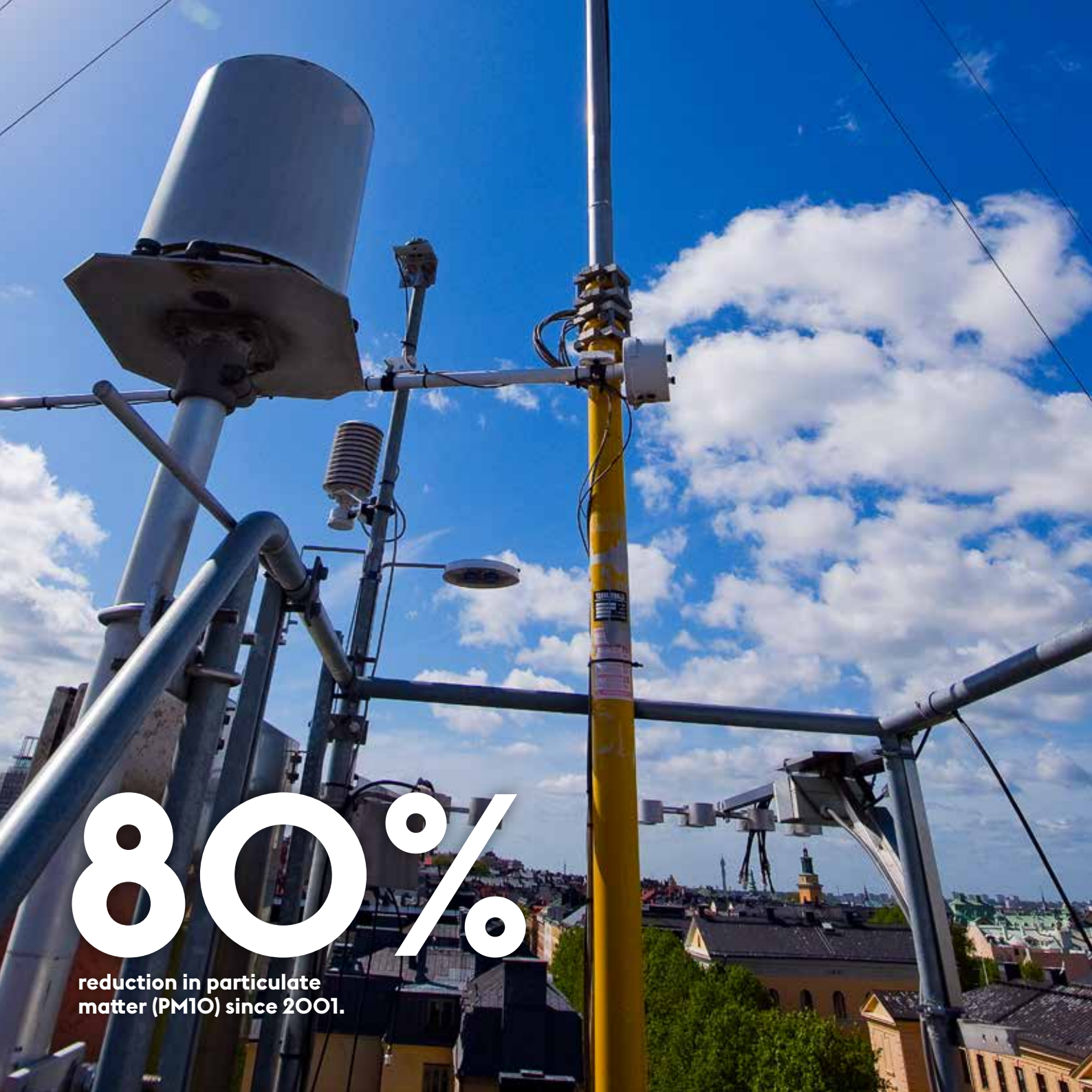
Solar map

Stockholm's high solar radiation is comparable to that of cities in central Europe. In order to facilitate solar cell installations by property owners, the city's website includes a solar map of Stockholm. This is an interactive tool that enables users to easily see how much solar radiation falls on a particular rooftop and the potential this offers for solar power and solar thermal energy.

The city's climate strategy states that by 2040 electricity production based on solar energy shall represent ten percent of the city's own electricity use.



The solar map shows the solar radiation falling on rooftops in Stockholm.



80%

reduction in particulate
matter (PM10) since 2001.

Air

The air in Stockholm has improved considerably over the past fifty years. Air pollutants that previously caused major problems – sulphur dioxide, lead, carbon monoxide, benzene and others substances – have now been cut considerably with wide margins to spare. The levels of sulphur and lead have been reduced by 99 and 90 percent, respectively. This is due to the expansion of the district heating network, lower sulphur content in fuels and the phasing out of leaded petrol. In recent years, stricter emission requirements, refined vehicle engine technology and the increased use of renewable fuels have also helped improve air quality. The soot content has been reduced by two thirds since 2007 and fine particles have been reduced by about 80 percent since 2001.

Studded tyre ban

Since 2014, the EU limits for PM10 have also been met. In Sweden and the other Nordic countries, high levels of PM10 are caused primarily by the studded winter tyres that are used during the winter months. As a consequence, studded tyres have been banned on three of the most heavily trafficked roads in Stockholm. In addition to this, measures are being taken to reduce the resuspension of road dust.

The EU limit for PM2.5, for the protection of human health, is met with a wide margin in Stockholm. These levels are largely caused by airborne particles from other parts of Europe.

The levels of nitrogen oxide have fallen over the last few decades, but have levelled out in recent years. This is due to an increased share of diesel vehicles in the region. In spite of this, Stockholm has no difficulties meeting the EU limits. Sweden has, however, introduced stricter environmental quality standards that Stockholm still has trouble fulfilling.







The City of Stockholm's goal is to continue reducing greenhouse gas emissions. The goal for 2015 was 3.0 and the outcome was 2.5 tonnes.

The goal for 2020 is 2.3 tonnes per Stockholm. The city's long-term climate goal is for Stockholm to be fossil fuel-free by 2040.

70%

increase in cycle traffic in ten years.



800 km

of cycle paths and cycle lanes in Stockholm.

Traffic

During the morning rush hour, some 198,000 people travel by public transport into the city. The corresponding figure for cars is about 54,000 people. More than 52,000 cyclists passed through the inner city during surveys in May. Despite so many people cycling or using public transport, Stockholm's greatest environmental problem is vehicular traffic. Consequently, the City of Stockholm works actively to reduce the impact on health and the environment caused by traffic.

Congestion charge

Congestion charges were introduced on a trial basis in 2006 for travel into and out of the central parts of Stockholm, corresponding to 20 percent of the municipal land area. Congestion charges were introduced permanently in 2007 following a referendum in which Stockholmers responded positively to the measure. Today, traffic to and from the inner city is 30 percent lower when charges apply compared to 2000–2005.

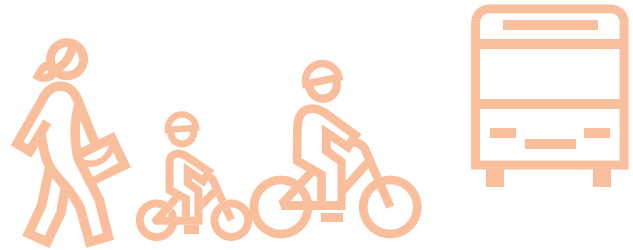
Accessibility strategy

The city's accessibility strategy shows how we can meet increasing travel by balancing and prioritising different needs in the available space. The accessibility strategy offers four principles for how the city shall prioritise in decisions both large and small so that the capacity and reliability of road and pavement traffic can be increased and contribute to a safe, attractive, environmentally friendly and healthy Stockholm.

The four main principles of the strategy:

- More space for buses and cyclists, that is, more reserved lanes. A stationary bus in a traffic jam does not attract anyone to public transport if they have other alternatives. This means that parking spaces along roads cannot always be kept.
- Traffic shall be more reliable. Travellers should be able to work out how long a journey will take, regardless of how they choose to travel. Public transport shall experience better accessibility in its reserved lanes.

- Pedestrians shall be given better conditions, such as better lighting, better cleaning and better snow removal on pavements.
- Reduce the negative effects traffic can have on city life. In order to divert traffic away from the inner city, new road tunnels are being built to redirect traffic underground. Public transport is being expanded by means that include a new commuter train station under central Stockholm. Four new metro lines are planned and the tram network is to be expanded.



Cycling

Stockholm has about 800 km of cycle paths and cycle lanes. Over the past ten years, cycle traffic has increased by 70 percent, and during the summer months about 15 percent of Stockholmers choose to cycle. This is a trend that became even more noticeable after 2004, much due to the city's initiatives to encourage cycling and the investments made in recent years to improve the situation for cyclists.

In order to further develop the cycle route network, the City of Stockholm has drawn up a cycling action plan that is to be used in the city's urban planning. Actions include new cycle paths and cycle lanes, new parking facilities and measures to improve accessibility. In conjunction with new urban development, plans are to allow for increased cycling and, consequently, an increased need for cycle parking. Leading up to 2018, the city is investing a total of SEK one billion in the expansion of cycling infrastructure.

25%

of the city's lakes and waterways
achieve good ecological status.



Water

Water and the opportunities it offers for bathing, fishing and boating are important for Stockholmers, but even for tourists visiting the city. Clean water is a legacy we must cherish and maintain. In order to strengthen water initiatives, in 2015 the city council adopted an action plan to ensure that Stockholm's lakes, coastal waters and waterways live up to the EU's environmental quality standards for water. Stockholm is now developing local action plans for each of its 23 bodies of water.

Bathing places

In the 1940s and 50s, the water in Riddarfjärden was so polluted it was known as the dirty ditch. Today, you can bathe anywhere in Stockholm due to ambitious water management initiatives. Stockholm now has 31 official waterside bathing places. Generally, the bathing water is of good quality. During the years 2010–2014, the share of bathing water samples given the all-clear was 82 percent.

Storm water

The City of Stockholm has developed a storm water strategy that is to develop storm water management towards a more sustainable approach that mimics nature's way of dealing with precipitation. One aim is to improve the quality of storm water, another is for the city's urban planning to account for future climate change with increased rainfall. Leading up to 2100, rainfall is expected to increase by 30 percent, which will result in increased storm water flows.

Drinking water

The City of Stockholm sources its drinking water from Lake Mälaren, and the lake provides a total of 2.5 million people with their drinking water. Climate change is expected to deteriorate water quality in various ways. Today, there is a considerable flood risk around Lake Mälaren, but once the sluice gate Slussen has been redeveloped it will be possible to release more water from the lake. The banks of Lake Mälaren will then be protected against the effects of flooding for the next 100 years.

Henriksdal wastewater treatment plant

With its 300,000 m² and some 18 kilometres of tunnels, the Henriksdal wastewater treatment plant is one of the largest facilities of its kind in Europe housed inside the bedrock. The plant currently treats wastewater from about 800,000 people. Henriksdal is now being redeveloped to meet stricter environmental requirements and to treat twice as much water as today. Modern membrane technology will enable greater quantities of water to be treated and the water that is released will be cleaner. The new technology also makes it easier to separate pharmaceutical residues, which will greatly benefit the environment.



Water is simply always there in Stockholm, and the central districts comprise a city built on islands.

A close-up photograph of a young child with curly brown hair, wearing a red jacket with a grey collar and a yellow hair clip. The child is holding a green apple in their mouth and taking a bite. The background is a soft, out-of-focus green, suggesting an outdoor setting.

70%

– yes, that is the level to which Stockholm's
waste food collection is to increase by 2020.

Waste

Each Swede produces roughly half a tonne of waste annually. It is important that this amount is reduced and that waste is properly managed. Stockholm has a waste action plan specifying the goals the city has for waste and how they are to be achieved. Achieving them will require trial runs involving several technical solutions.

- Green bags.
- New plant for gathering and sorting food waste in Högdalen, south Stockholm.
- Biochar.
- Noise-damping containers.
- Textile recycling.

Green bags

One of the city's goals is to increase Stockholm's food waste collection to 70 percent by 2020. The green bags for food waste entail households sorting their waste into different coloured bags according to type. The coloured bags are then sorted, with the green bags (which contain food waste) separated for later composting. A new plant for gathering and optically sorting these waste bags is planned for construction in south Stockholm.

Biochar

Another project is the Stockholm Biochar Project, wherein park and garden waste is used to make biochar. Biochar improves soil quality and one of its uses is to improve living conditions for the many trees lining the city's streets.

As the city grows, our recycling stations must be adapted to a denser urban structure. Accordingly, a new type of noise-damping container is currently under development. This will free up more land for housing or offices while also resulting in a quieter work environment at recycling stations.



Recycling textiles

Since 2012, Stockholm has worked with a project to reuse and recycle textiles. The project has come to an end and has provided knowledge and experience. Work now continues to find new logistics solutions for collecting textiles.





70%

percentage of Stockholmers who
spend time in park/nature areas.

A small, light-colored bird with a dark eye and a dark beak is perched on a green pine branch. The bird is facing left. The background is a blurred blue sky with green foliage.

183 m

is the average distance to the nearest
green oasis.

Green spaces

One third of Stockholm's green spaces and water areas are protected. There are ten nature reserves, as well as many beautiful protected shorelines, within the city limits. Plants and animals interact with each other and their environments in what are known as ecosystems. These provide a number of benefits, so-called ecosystem services, on which we humans are dependent.

Ecosystem services is the name given to the benefits that nature's different ecosystems and organisms provide us with. They satisfy human needs and well-being and are extremely important to sustainable urban development.

Nature reserves

The nature reserves in Stockholm are important to the urbanised fauna and act as wildlife corridors into the city centre, but they are even important to the city's inhabitants as recreation areas. There are also three so-called Natura 2000 areas in Stockholm, which are part of the EU's network of nature protection areas. In a special project called Guide to Silence, the city has produced guides for trails that lead to 65 peaceful places in the city's nature areas. The idea is to increase accessibility to areas and places that offer a combination of calm and green experiences.

Strategic planning material

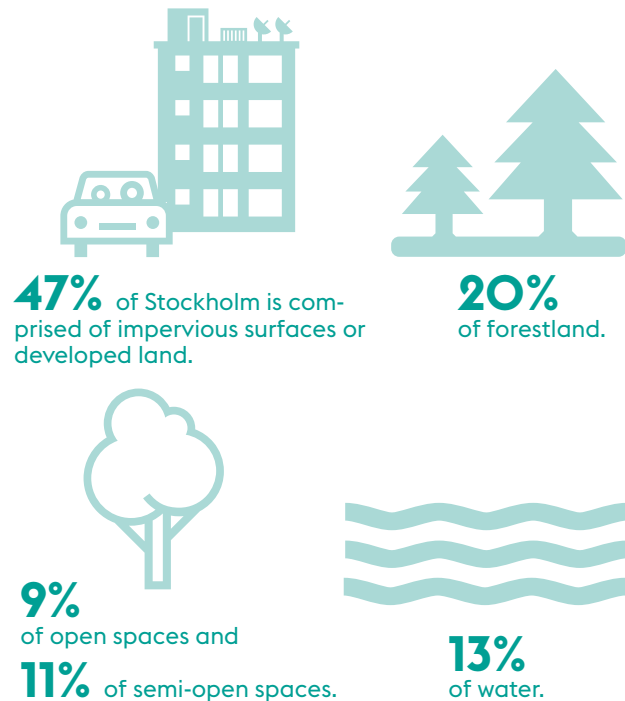
Stockholm has a long tradition of working with strategic planning material for the city's green spaces in the shape of biotope surveys and analyses of green infrastructure. Stockholm has also developed a strategy for a Greener Stockholm.

Green space factor

The green space factor is a tool that aims to support system solutions wherein urban greenery and storm water are managed in various ways to strengthen ecosystems and compensate for the negative effects of climate change while also creating attractive gardens and outdoor environments.

The green space factor promotes greenery that fulfils several functions, such as creating green spaces for recreation, delaying and purifying storm water, offering shade, contributing to pollination and being beautiful to behold.

This tool has long been used in places such as Germany. A model adapted for Stockholm has been refined for use as a general planning tool for land earmarked for urban development.





0%

fossil fuels by 2030 is
Stockholm Royal Seaport's goal

Stockholm Royal Seaport

Environmental profile areas

Some 100 years ago, Stockholm was one of the most impoverished, dirty and unhealthy cities in Europe. Housing was poor and overcrowding was widespread. Accordingly, the first environmental projects were to build new housing areas with healthy homes. Stockholm's inner suburbs are examples of modernism's early adoption in the city. This was the modern city for modern people. Today, yet another new Stockholm is evolving, and now the ambition is to build a dense and sustainable city. Three areas in today's Stockholm are so-called environmental profile areas – Hammarby Sjöstad, Stockholm Royal Seaport and Järva. All implementation shall be characterised by sustainable urban development with environmentally effective solutions, energy use, transportation, climate adaptation and circular economies.



1. The environmental profile areas have consolidated Stockholm's position as a leading capital city in climate initiatives.
2. The environmental profile areas support the marketing of Swedish environmental technology.
3. The environmental profile areas shall be forerunners that develop new technology that will later benefit all housing construction in Stockholm.

Hammarby Sjöstad

Hammarby Sjöstad was intended as an Olympic Village in conjunction with Stockholm's bid to host the 2004 Olympic Games and environmental aspects had a prominent role. Instead of becoming an Olympic Village, Hammarby Sjöstad became one of Stockholm's largest urban development projects, encompassing more than 10,000 homes with a pronounced green profile. The city has had to greatly transform the infrastructure in order to develop the area. Traffic barriers have been overcome through new constructions and old industrial and goods terminal areas have been wound down, consolidated or re-purposed.

Hammarby Sjöstad has its own environmental programme that aims to focus on environmental issues in all planning and implementation. The goal was to halve its environmental impact compared to older city districts. The district also has its own circular economy model – the Hammarby Model – which shows how energy, waste and water management can be integrated.

Stockholm Royal Seaport

Stockholm Royal Seaport is one of Europe's largest urban development projects. Robust and flexible solutions are being created here. Resources are used effectively and renewable energy sources are used to create the conditions for a fossil fuel-free city district by 2030. The district is being adapted to face a changing climate, and the connection to nature is strengthened through parks and green structures in the district.

Stockholm Royal Seaport has shown that it is possible to produce new builds in which 55 kWh/m² is sufficient to achieve a good indoor climate at a reasonable cost. The results have been so good that this has become a requirement for all construction on the city's landholdings. At the climate summit in Paris in December 2015, C40 (the largest cities in the world working to fight climate change) named Stockholm Royal Seaport the most sustainable urban development project in the world.

Järva

The Sustainable Järva Project, implemented 2010–2014, involved developing the city districts around Järvafältet into one of Stockholm's environmental profile areas alongside the renovation of housing built under the million programme. Seven apartment blocks in the suburbs of Husby, Akalla and Rinkeby attained the goal of halving their energy consumption while the buildings were renovated using a new energy-efficient technique. Investments in renewable energy and solar cells made Järva one of the places in Sweden with the highest density of solar cells, boasting more than 10,000 square metres of solar cells. These are estimated to be able to produce enough energy for about 15–20 percent of the buildings' electrical needs for apartments and 6 percent for swimming pools, as well as generate 1.3 million kWh of solar power each year.

Järva is now a national and international role model for the sustainable renovation of housing areas from the post-war period.



Järva



Stockholm Royal Seaport



Hammarby Sjöstad







The city's flora and fauna are a heady mix of native, exotic and feral species.

Many plants and animals have adapted successfully and thrive in Stockholm, while others require proactive management to ensure their long-term survival. These beehives were located in Björkhagen.





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184

**schools and pre-schools were environmentally
certified in 2016.**

Chemicals

Chemicals action plan

The City of Stockholm has had a chemicals action plan since 2014. The plan describes how the city's operations are to work towards the vision of a pollutant-free Stockholm through a number of measures in different areas.



Chemicals Centre

In order to facilitate the implementation of the chemicals action plan, the City of Stockholm has established the Chemicals Centre, which gathers expertise in chemistry and ecotoxicology. The Chemicals Centre helps the city, trade and industry and inhabitants avoid harmful substances and reduce the risks associated with them.

The Chemicals Centre works with:

- Chemical requirements in procurement.
- Choice of building materials.
- Safe handling of chemical products.
- Information to consumers and businesses.
- Training for city personnel.
- Special focus on children and youth.

Chemical-smart pre-school

Small children are particularly sensitive to exposure to chemicals and as such the Chemicals Centre has a special project aimed at pre-schools. The project focuses on guidance and training for pre-school personnel. In order to reach out to all personnel in an effective manner, an online training course has been developed.

The Chemicals Centre also pursues environmental monitoring in environments where children spend time to assess the levels of chemicals that are hazardous to health and the environment. Samples have been taken from dust at 100 pre-schools, and the results show that there are no hazardous chemicals above safe limits in such dust. Consequently, current wisdom indicates that exposure to dust at pre-school has no harmful effects. However, it is important to continue phasing our hazardous chemicals in building materials and other products to reduce children's total exposure.

The city has a chemical management system in which all municipal departments and companies are to register the chemical products used in their operations. The purpose is to be able to conduct systematic substitution work in which chemicals harmful to both health and the environment are gradually phased out.

NonHazCity

NonHazCity is an inter-regional Baltic Sea project coordinated by the City of Stockholm. The project, which began in March 2016 and runs until February 2019, encompasses 18 partners (municipalities, wastewater treatment plants, universities and NGOs) in Sweden, Finland, Estonia, Latvia, Lithuania, Poland and Germany. In the participating municipalities, sources of harmful substances are to be identified, chemicals action plans are to be devised and information campaigns are to be aimed at businesses and inhabitants. The cities shall also work with their own chemical use by including chemical requirements in procurement and in construction work, as well as by establishing chemical databases to improve the opportunities for substituting harmful substances. The aim is to reduce emissions of harmful substances from cities into the Baltic Sea.



>35 dBA

The number of people exposed to 35 dBA indoors has fallen by 80% since the 1970s.

Noise

The city has long worked to reduce noise pollution and many of the measures taken have proved successful. In 1970, 200,000 Stockholmers were exposed to unacceptable noise levels in their apartments, that is, levels in excess of 35 dBA. Today, this figure has dropped to a few thousand people, a reduction of 80 percent. 60 kilometres of noise barriers, and more than 50,000 windows with improved soundproofing in 17,000 apartments along 130 kilometres of roads, have produced results. But there are many other measures that have helped improve noisy environments. Increasingly fewer studded tyres enable the use of less noisy asphalt, which in turn means lower noise levels. Covered roads and railways and traffic in tunnels result in effective local noise reduction. Cars and buses have also become more fuel efficient and quieter.

Noise-adapted development

Stockholm also has many examples of new, noise-adapted development close to traffic that have helped improve noisy environments for nearby housing and park areas. The environmental zone in the city has also accelerated development towards less noisy heavy goods vehicles, which together with the night-time ban on HGVs has reduced sleep disturbances.



30% state that they are very or extremely disturbed by some kind of noise in their home, indoors or outdoors.



Smart Cities

Stockholm is one of the world's most connected cities, with a fibre network that reaches more than 90 percent of households and almost 100 percent of businesses. The fibre network in Stockholm is the world's largest open fibre network and would wrap around Earth more than 30 times with its 1.25 million kilometres of fibre and 5,500 kilometres of cable.

Sustainable society

Environmental and information technology are prioritised to attain and develop a sustainable society. Green IT is an umbrella term for improving the environment, cutting energy consumption and reducing climate impact with the help of IT. The City of Stockholm has a strategy for green IT that is based on the goals set out in the city's environmental programme. Green IT is very much about using information technology to lessen an organisation's environmental impact.

One possibility is to use IT-based control systems to control heating, ventilation and cooling. But it is also about stimulating new technology to reduce the energy-related emissions from buildings.

Another of the city's goals is a sustainable transport system based on new technology. The accessibility and availability of different means of transport will be increased with the aid of new technology and IT. This entails developing intelligent transport solutions and IT support for navigation.

GrowSmarter

The City of Stockholm, together with Cologne and Barcelona, is heading the EU's GrowSmarter project. Using smart environmental technology solutions within energy, infrastructure and transportation, the goal is energy optimisation and reduced climate impact while creating job opportunities. In the Årsta and Slakthus districts of south Stockholm, sustainable solutions within fields that include transportation, energy-effective renovations, renewable energy and smart waste management are being exhibited and evaluated for later use on a larger scale throughout the city. The aim is to reduce energy consumption and emissions from transportation by 60 percent while also creating 1,500 new jobs in close collaboration with environmental technology companies.

90% and

of households

100%

of businesses are reached by the fibre network



Green vehicles

With more than 800 vehicles, the City of Stockholm has one of Sweden's largest green vehicle fleets. The vehicles are used in extremely diverse operations, such as home help services, property management and social services. A full 97 percent of the vehicles in the city's fleet are green vehicles. The share of gas-powered vehicles is 44 percent while 20 percent are plug-in electric vehicles.

Drives the market

The city drives technology development and the market introduction of new technology via its procurement and by helping coordinate larger procurement processes for vehicles and transportation. In this way, Stockholm has contributed to increased demand for green vehicles.

Stockholm works ambitiously to bring about new stations for green fuels and electric vehicle charging. The goal is 500 public charging stations on municipal land by 2020.

EU projects

Since 1996, Stockholm has coordinated and participated in several important EU projects together with other major world cities. These include the following:

- BEST (market introduction of ethanol-fuelled vehicles).
- Biogasmax (increased biogas production and use of biogas in vehicles).
- CleanTruck (biofuels for heavy goods vehicles).



Almost one in five vehicles is green.

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The Capital of Scandinavia

