A LITTLE BOOK ABOUT THE ENVIRONMENTAL WORK IN THE CITY OF GOTHENBURG

GOTHENBURG AND THE ENVIRONMENT

City of Gothenburg

BUILDINGS

How do we build a city that does not burden the environment? Buildings are a key question where a sustainable future is concerned.

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TRANSPORT

We need to reduce the environmental impact of our transport. How can we and our goods be transported sustainably?

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NATURE

In a growing city, nature has to be considered, both nature inside the city as well as forests and land outside the city.

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CONSUMPTION

Consumption of goods and energy plays a big role in our environmental impact. How can we make wiser and better choices?

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THIS IS HOW YOU FIND WHAT YOU'RE LOOKING FOR


RICH NATURE IS WORTH PROTECTING

IN GOTHENBURG MANY VALLEYS with streams converge and then join up with the mighty river. One example is Säveån which boasts a unique salmon stock. Another is the Lärjeån valley which also possesses high natural value. The Göta river then finds its way out into the sea with all the myriad islands. On Hisingen there is everything from open sea to agricultural land and wetlands. There in the small lakes and ponds you can find the Great Crested Newt, protected under the EU species and habitat directive.

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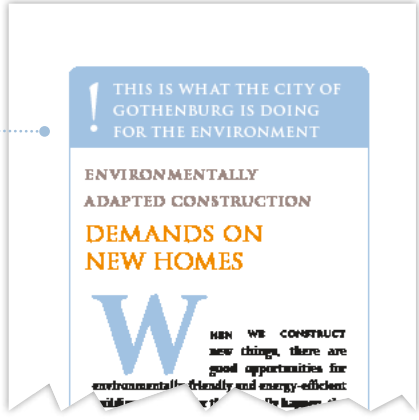
LOCAL ENVIRONMENTAL OBJECTIVE: REDUCED CLIMATE IMPACT

"By 2050 Gothenburg will have a sustainable and fair emission level for carbon dioxide."

IN ORDER TO LIMIT the global warming we must, in time, stop using fossil fuels such as oil, coal and natural gas. If we don't


THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

ENVIRONMENTALLY ADAPTED CONSTRUCTION

DEMANDS ON NEW HOMES

WHEN WE CONSTRUCT new things, there are good opportunities for environmentally friendly and energy-efficient

1. THE PRESENT AND THE FUTURE

Here you will find an overall picture of the environmental situation in Gothenburg. The coloured arrows refer to the pages where you can extend your knowledge.

2. LOCAL ENVIRONMENTAL OBJECTIVES

Presented here are the environmental objectives that the City Council has agreed on.

3. WHAT IS THE CITY OF GOTHENBURG DOING?

Here you will find information about what is being done in the City of Gothenburg with regard to environmental work.

CHANGE...

There is one thing that we can surely all agree on. We want to continue to live a good life without damaging our environment. With wise decisions today we create the conditions for a sustainable future. The challenge of an environmentally-adapted city must be accepted by all of us: politicians, businesses and the everyday people of Gothenburg.

How we live, work, travel and shop affects the environment, both within and outside of Gothenburg. We have steadily improved things over the last 50 years. But our rising standard of living has an unfortunate sting in its tail. We use more energy, we cause more emissions, more noise, more waste and we do not husband nature's resources well. We now have a common responsibility to put a stop to this development and to create a sustainable environment for those of us living now and for future generations.

We can be happy that problems that were alarming a few decades ago, now look as though they can be solved. The thinning of the ozone layer is an example of this. Other environmental problems remain, not least of all climate change, and new ones are being added. We can solve a number of problems with new technology and legislation but there is also going to be a need for courageous decision-makers and for all of us to be prepared to change our lifestyle.

In *Gothenburg and the Environment*, we describe the environmental situation in Gothenburg today. What are today's problems about? What can we do to solve them? What goals do we need? There are many questions, but the positive factor is that much has already been done and there is more under way.

We place a focus on four different areas that are crucial for our future environment. It is about old and new buildings, about transport, about our nature around us and about our consumption. We aim to create a sustainable city. A city where we all thrive. Do you want to be involved?

BUILDINGS

IT IS TIME TO BUILD A CITY THAT DOES NOT IMPOSE A STRAIN ON THE ENVIRONMENT

Two apparently identical houses can have an entirely different impact on the environment. Both can be equally pleasant and cosy, but differ in terms of their choice of insulation, heating and electrical appliances. The buildings that already exist account for about one third of the community's consumption of energy and emissions of greenhouse gases. But today it is fully possible to build houses that do not consume energy or cause emissions of greenhouse gases. If Gothenburg is to limit its impact on the climate, then buildings are a key factor.

THE WAY IN WHICH WE BUILD and refurbish today will influence far into the future. Throughout the whole of Sweden we are faced with refurbishment of the homes that were built under the million programme in the 60s and 70s. About 60 percent of the existing blocks of flats in Sweden require refurbishment over the next decade. When these homes are under reconstruction there will be great opportunities for improving their energy efficiency.

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GOTHENBURG'S CENTRE GROWS ACROSS THE RIVER

GOTHENBURG IS GROWING and thousands of new homes need to be built every year. But how is it to be done in an environmentally friendly way? The fact is that Gothenburg enjoys a unique opportunity to grow right in the centre. On both sides of the river, where the port and industrial areas had been previously, there are plans to develop central Gothenburg. The hope is that the people of Gothenburg will find it easier to access the Göta river and that Hisingen and the mainland will be joined together so that the centre of Gothenburg becomes both bigger and nicer. The area is called Centrala Älvstaden and includes, for example, the Frihamnen, Ringön, Backaplan and Gullbergsvass. In the longer term 40 000 new jobs and 30 000 new inhabitants are envisaged as being located here. In order for this to succeed from an environmental perspective it is important for the buildings to be energy-efficient, but also for it to be a homogenous city where one can live, work and shop without being dependent on the car.

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New buildings close to the stop

Naturally there will be a need to build in other parts of Gothenburg too. Gothenburg is currently characterised by urban sprawl and, therefore, a car-dependent city. The aim is therefore to supplement with further building in the future where there already exists good public transport and services. By mixing the forms of housing, workplaces and trade successfully it will be possible to live in a district in all phases of one's life.

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HOW SHALL WE BUILD TO SUIT THE ENVIRONMENT?

MANY IMPORTANT steps have already been taken towards reducing the environmental effect of buildings. The overall energy consumption in buildings has remained about the same in Sweden over the years, despite the fact that we now have a much bigger living area per person. There is still a long way to go before we achieve buildings that do not impact on the environment.

One of the greatest challenges is to reduce the climate impact and to improve energy efficiency. That is why the City of Gothenburg has, for many years, prioritised the objectives that *Consumption of fossil fuels shall decrease* and that *Electricity efficiency* shall increase. In order to succeed in this, improvements are necessary within several sectors. Fossil fuels, such as oil and natural gas, need to be replaced by more environmentally-friendly alternatives when electricity and heating are produced. When we refurbish homes and build new ones, they need to be better suited to the environment and to be energy efficient. Finally, we all need to live in a way that consumes as little energy as possible, where we live and work.

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DISTRICT HEATING CAN BE ENTIRELY FOSSIL-FREE

In Gothenburg 90 percent of all blocks of flats and premises are heated by district heating. More and more one-family houses are also being connected up to the district heating network. The principle of district heating is simple: hot water is carried through a closed piping system and heats our radiators and the hot water in the taps. District heating is an energy-efficient system which, over the years, has replaced thousands of small boilers.

From an environmental perspective it is of particular importance which type of fuel is used. In the 70s heating was mostly generated by oil, causing poor air quality and major emissions of greenhouse gases. Today oil is being replaced entirely by more environmentally-friendly alternatives in one-family houses and most of the district heating comes from bio-fuel and waste heat, that is to say surplus heating from waste incineration, industrial processes and waste water treatment.

In the summer this waste heat is enough to cover the need for district heating. During the winter we also use bio-fuels and natural gas Natural gas is a fossil fuel which, in time, needs to be replaced by bio-gas. We already produce bio-gas in Gothenburg through anaerobic digestion of sewage sludge at Rya's waste water treatment plant. There are plans for anaerobic digestion of biological waste as well, i.e. compost from households. This will be a good addition but, if all natural gas is to be replaced, then very large volumes are going to be required. The first step in a large-scale bio-gas production based on forest waste is planned through the GoBiGas project.

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ENERGY-EFFICIENT HOUSES

At present it is fully possible to build housing that does not require any kind of active heating at all. This so-called passive house utilises the heat that people and electrical equipment give off. By building densely and with good insulation we get the heat to remain inside the house. To prevent the indoor air from becoming bad there is a need for ventilation that takes in fresh air. By heat-exchanging incoming and outgoing air, the fresh air is heated up before being brought into the space. Nowadays there are even examples of plus-houses – i.e. houses that provide energy instead of consuming energy. This is possible if, for example, solar cells are installed. In the Gothenburg region there is Sweden's first and biggest example of a passive house. For those building new homes on municipal land in Gothenburg, there are tough environmental requirements imposed before the land is handed over.

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INDUSTRY: MAJOR EMISSIONS AND NEW GREEN TECHNOLOGY

In Gothenburg industries and energy plants account for about two thirds of the carbon dioxide emissions. The biggest emitters are included in the EU's Emission Trading System. They therefore have to pay for each kilo of carbon-dioxide that is emitted. If the emissions are reduced the companies can sell their emission permits. The amount of emissions throughout the entire EU is limited and is reduced at regular intervals. In this way the overall climate effect from industry in Europe is also reduced.

It is important that industry reduces its own emissions. But industry also has an important role to play in developing new technology that can reduce the environmental impact, locally and globally. It concerns, by no means least, sectors such as the automotive industry and the refineries, which are major commercial activities in Gothenburg. With the development of, for example, environmentally-adapted cars and biofuels which replace earlier products that are a burden on the environment, a transition to a sustainable society can be accelerated.

IS CLIMATE CHANGE A THREAT TO GOTHENBURG?

With the emissions from fossil fuels the earth's average temperature increases, along with stronger winds and increased precipitation as a consequence. The effects will be very different in different parts of the world.

The most serious threat against Gothenburg is temperature increases which, in turn, raise the sea level. It is the sea level that primarily determines the water level in the Göta river. Under extreme weather conditions such as heavy storms, there would be major flooding for low-lying areas alongside the river. Another example of risk in the wake of climate change is that roads, railways and other infrastructure will be disrupted, that landslides occur in the river valley or that sewage water overflows.

Read more on page 12

Don't we have plenty of drinking water?

A few people of Gothenburg have their own wells and get their drinking water from the groundwater. The Göta river supplies 700 000 people in Gothenburg and other municipalities with drinking water. The river's water volumes are enormous, but whether or not the quality is adequate in the future is not self-evident. A raised sea level due to climate changes increases the risk of saltwater getting into the raw water intake in the Göta river. The water quality is also vulnerable to high water temperatures and increased precipitation. An additional reservoir would make access to drinking water more secure.

Read more on page 9

LOCAL ENVIRONMENTAL OBJECTIVE: REDUCED CLIMATE IMPACT

"By 2050 Gothenburg will have a sustainable and fair emission level for carbon dioxide."

In order to limit the global warming we must, in time, stop using fossil fuels such as oil, coal and natural gas. If we don't do so the greenhouse gases in the atmosphere will increase and create climate change which is a threat to humans, animals and plants.

The world's climate researchers meet regularly via the UN's climate panel (IPCC). The increase in the world's average temperature needs to be limited to two degrees. In order to achieve a sustainable and globally fair emission level each inhabitant of Gothenburg needs to reduce their emissions of greenhouse gases to a fifth of the present level – from ten to two tons.

A transition from energy-efficient and fossil-free solutions requires new technological solutions, courageous decision-makers and climate-aware consumers. We need to change transport, energy consumption in residential and commercial premises, as well as consumption of goods and services. In order to attain this goal it is also necessary for us to continue to concentrate on public transport, cycling and walking and rail freight.

LOCAL ENVIRONMENTAL OBJECTIVE: GOOD-QUALITY GROUNDWATER

"The groundwater contributes towards good life environments for people, animals and plants, and also constitutes a secure and sustainable raw water for private water supplies in Gothenburg 2020"

Groundwater is formed by rain and melt-water seeping down and filling cavities in the ground and cracks in the bedrock. In Gothenburg there are less than 3 000 households that have their own wells and that take their drinking water from the groundwater, but this can be a valuable resource in the future.

The groundwater can be destroyed if one removes the natural gravel, uses too much groundwater or builds roads and tunnels in a careless manner. The groundwater can, moreover be polluted by air pollutants or leakage from, for example, waste deposits or agriculture. In Gothenburg the groundwater by old waste deposits has been affected by metals.

NATIONAL ENVIRONMENTAL OBJECTIVE:
A GOOD BUILT ENVIRONMENT

"Cities, towns and other built-up areas must provide a good, healthy living environment and contribute to a good regional and global environment. Natural and cultural assets must be protected and developed. Buildings and amenities must be located and designed in accordance with sound environmental principles and in such a way as to promote sustainable management of land, water and other resources." *

MANY PEOPLE WANT to live in the city. There are opportunities here for studying and working and here you can enjoy the city's diversity and street life. From an environmental perspective the conditions are extremely good in a large city. To live at close quarters means that it is easier to get to places on foot on by bike. With lots of people there is a basis for good public transport. The density also makes it easier to create more environmentally-friendly solutions for heating of buildings by, for example, district heating.

But dense housing also means that the risk of disturbances is greater. A city that is well planned has relaxing and attractive places and it makes it possible for the inhabitants to reach greenery and water. The risk is, otherwise, that the city becomes stressful and unhealthy. Traffic, industries and waste run the risk of resulting in a city with poor air quality, noise and other environmental effects.

Gothenburg is growing all the time, which means that there are opportunities for changes and improvements. A big challenge is that of preserving the qualities that make the city attractive today while, at the same time, building on old industrial grounds and allowing areas with good public transport to grow, without valuable green areas disappearing. A sustainable city also means that energy consumption and the amounts of waste also have to decrease.

**) A local environmental objective for a good built environment will be drawn up in Gothenburg.*

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

COMPREHENSIVE PLAN FOR GOTHENBURG:

WHAT CAN BE FOUND WHERE?

The comprehensive plan is the municipality's long-term vision regarding the use of the city's land and water areas and how the building is to be developed. In the comprehensive plan it is stressed that the city's infrastructure shall be employed efficiently and that the environmental impact of the traffic shall be minimised.

Continued planning in Gothenburg shall, in the first instance, be undertaken with a view to supplementing the constructed city in combination with the building of strategic nodes such as City, Backaplan, Frölunda Torg, Gamlestaden and the centre of Angered. A node shall be an important changeover place for public transport and shall have many people living nearby. In addition there shall be shops, other services and workplaces nearby.

One of the strategic aspects of the comprehensive plan is *An attractive city environment*, where the point of departure is people's opportunities for moving about and living in the city space. It will be increasingly important to have green areas and water in a city that is being built more densely. All construction should be undertaken so that the environmental impact is minimised. Another of the strategic questions is *Changing transport demands*, where the connection between construction planning and traffic is stressed. Good public transport shall already be in place before the new areas are developed. A compact city makes it possible for more people to walk or cycle.

Download an English summary of the comprehensive plan at www.goteborg.se/oversiktsplan

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

ENVIRONMENTALLY ADAPTED CONSTRUCTION

DEMANDS ON NEW HOMES

When we construct new things, there are good opportunities for environmentally-friendly and energy-efficient building. In order for this to really happen, the City of Gothenburg has a *Programme for environmentally-adapted construction*. The programme involves high environmental requirements with regard to so-called ground allocations, i.e. when the municipality makes ground available and gives building the go-ahead.

The programme is divided into several sectors, all of which are of importance for ecological construction. Amongst other things it is a question of durability, i.e. that a building shall have a long lifespan. Another example is damp protection, noise protection and environmental impact. Environmental impact means that a building shall have as little impact on the environment as possible, both while being built and during its lifespan.

There are also strict demands that the buildings shall be energy-efficient. For example a block of flats shall consume maximum 60 kilowatt hours per square metre for its heating and domestic electricity. This can be compared with the Swedish National Board of Housing, Building and Planning's rules, which lie at 110 kilowatt hours per square metre.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

EXTREME WEATHER

The climate changes pose extra risks for places close to the coast, where a raised sea level can have major consequences. In order to prepare itself for this, the City of Gothenburg has conducted several investigations under the heading of Extreme Weather. In these, changes to the sea level is identified as the greatest threat since, with extreme weather situations, large parts of central Gothenburg would be flooded and damaged and there would also be disruptions within the transport system as well as with regard to our electricity and water supplies.

It will be of extra importance to deal with the risks of flooding, since there is currently more building planned close to the river, e.g. in Gullbergsvass and Ringön. Common to these areas is that they are low-lying and close to the river. One result of the work with Extreme Weather is that the lowest floor level in respect of new construction shall be raised and functions of importance to the community are to be protected with even greater margins. To secure Gothenburg's existing central parts in the event of high water levels would cost billions of Swedish Kronor.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

HAMNHUSET – SWEDEN'S FIRST PASSIVELY HEATED BLOCK OF FLATS

When Hamnhuset in Sannegårdshamnen, with its 115 flats, was finished in 2008, it was Sweden's first passively heated block of flats. The building is primarily heated by means of surplus heating from electrical equipment, the residents' body heat and the sun. The energy required from outside comes from district heating and environmentally labelled electricity. The result is an energy saving of at least 50 percent and a reduction of carbon-dioxide emissions by 75 percent, compared with a conventional building. And this is still not at the expense of the standard and comfort that is expected of a modern building.

Behind Hamnhuset is the municipal company Älvstranden Utveckling. The aim was to lower the use of energy without raising the operating costs and, thus, the tenants' rent. Analyses show that passive houses use more material than normal houses, but the extra carbon-dioxide emission created through the manufacture of these materials, is "paid back" in less than three years. Living in Hamnhuset imposes no special demands on the tenants. On the other hand the residents are part of the development of the energy-efficient housing of the future.

Read more at
www.alvstranden.com/english

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KATJAS GATA – 66 PERCENT LOWER USE OF ENERGY FOLLOWING RECONSTRUCTION

At Katjas gata 119, in the middle of the million programme area Backa Röd and surrounded by grey, 40 year old buildings, there is an orange building which looks entirely new. In actual fact, it is just as old as the houses around it but, following renovation, the building's use of energy was reduced to a third of what it was previously. This is the result of a pilot project carried out by the municipal housing company, Poseidon.

In order to reduce energy consumption the crawl space, roofs and outer walls have been additionally insulated and all windows replaced by new ones with low energy ratings. The building is very airtight and, in order to guarantee a good interior climate, new inwards and outwards air ventilation with heat recovery, has been installed.

Taken as a whole these elements have such a low heating requirement that the house will only need additional heating via district heating during the year's coldest months. In all, the reconstruction means that the use of energy is reduced to 60 kilowatt hours per square metre, which is only a third of the previous consumption. In order to help the residents still further in reducing their use of energy, equipment for energy metering has been installed in each flat. The tenants will obtain detailed information about their consumption and only need to pay for the hot water and the electricity that they use. The chance of saving their own money becomes a further "carrot" for saving energy.

With the experience from Katjas gata, enormous opportunities open up for reducing energy consumption in Gothenburg, since many similar housing areas are going to need renovation.

Read more at
www.poseidon.goteborg.se/en

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

A MAJOR INVESTMENT IN BIO-GAS IN GOTHENBURG

LOCALLY PRODUCED BIO-GAS is one of the absolute best fuels from a climate perspective. By 2016, a new facility in Gothenburg is expected to produce bio-gas corresponding to 1.000 GWh of energy. Today, both bio-gas and natural gas is used in Gothenburg to produce electricity and heating and as a vehicle fuel. With increased production of bio-gas, the use of fossil natural gas, which contributes to an increased greenhouse effect, is reduced.

Gothenburg Biomass Gasification Project (GoBiGas) is the name of Göteborg Energi's major concentration on the production of bio-gas through the gasification of bio-fuel and waste from forestry. The plant will produce gas from forest waste such as branches, roots and treetops. A big advantage with bio-gas is that the existing natural gas network can be used for distribution.

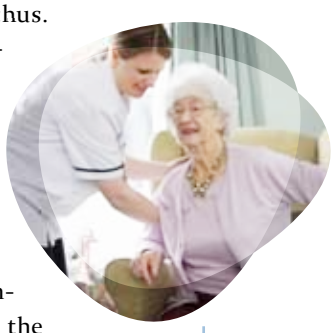
It is proposed that the plant will be located in Ryahamnen by the mouth of the Göta river, close to Gothenburg's electricity, gas and district heating network. The conditions are present here for environmentally-friendly transport of forest raw materials by both ships and rail.

Read more at
www.goteborgenergi.se/english

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

SAVED ENERGY AT THE RETIREMENT HOMES PROVIDES SOME MONEY FOR TREATS

BY MEANS OF ENERGY-SAVING measures, such as switching to low energy bulbs and using full washing machine loads, the personnel at around 30 retirement homes in Gothenburg have significantly reduced the use of electricity. The economy measures have resulted in cooperation with the property administrator, Medichus. Also included in the energy saving programme are energy seminars for personnel and regular energy monitoring.



The measures are often simple but effective. It can be a matter of not leaving electrical appliances on standby, maintaining the right temperature in the fridge and freezer and drawing up routines for airing. Sometimes technical solutions account for economies, e.g. by lighting being controlled by movement detectors.

The cost-saving that the personnel manage to achieve is returned to the elderly residents who then choose on how to use the ear-marked funds. With 14 percent less electricity consumption, there is a gain for both people and the environment.

TRANSPORT

IT IS IMPORTANT HOW GOODS AND PEOPLE MOVE ABOUT

Gothenburg has a long way to go in order to change to a city with environmentally-adapted travel. With its urban sprawl, the city is typically car-dependent. Since Gothenburg is the labour market centre for the entire Gothenburg region, the impact caused by travel and traffic is extra heavy. In Gothenburg there is also the biggest port of the Nordic region, resulting in much traffic both on land and at sea. In order to reduce the environmental effects, such as poor air quality, noise and emissions into the environment, big changes are needed.

THERE ARE A LOT OF POSITIVE things happening within this area. Environmentally-adapted cars are increasingly common and major investments in the railways and other forms of public transport are planned in Gothenburg, creating alternatives to car and heavy goods traffic. Together with concentration on a congestion charge and an altered parking policy, a unique opportunity opens up for converting Gothenburg into an environmentally-adapted cycle and public transport city.

CLEAN AIR MAKES A HEALTHIER GOTHENBURG

Road traffic has the greatest impact on the air we breathe, since the emissions are at ground level where the people are. If we look back 50 years in time, the air quality in Gothenburg has become a lot better. But at the same time, the traffic has grown which counteracts the positive effect of increasingly cleaner cars.

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Since many people are exposed to poor air quality, the overall health effects are also considerable. The number of premature deaths in Sweden due to pollution can be measured in the thousands which, in the case of Gothenburg, involves shortening the average lifespan by several months. The effects primarily express themselves through increased heart & vascular and pulmonary diseases. There are even more who are troubled by bad odours from air pollution and another common negative effect is irritation of the respiratory system. In an environmentally-friendly and attractive Gothenburg, one would be able to breathe fresh air and avoid concern about children becoming ill from the air they breathe.

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HOW DO WE TRAVEL IN AN ENVIRONMENTALLY-FRIENDLY WAY?

We travel ever-further distances to work and to go on holiday and even the goods on the shelves at the shops are travelling ever-further. Forecasts also indicate that the population of Gothenburg will increase, giving rise to increased travel.

The biggest challenge will be to get more people to travel in ways other than by themselves in a car. That is why the City of Gothenburg has, for many years, prioritised the aim of *The environment being improved in Gothenburg through travelling by public transport and cycling increasing in relation to car traffic*. In order to succeed, changes are needed in several areas. New homes, service and workplaces need to be located so that they are easy to reach on foot, by bike or public transport. Then the public transport needs to be developed for new passengers, not least of all from the municipalities around Gothenburg where travel is increasing most of all. The cars, buses and goods vehicles that are driven in Gothenburg also need to reduce their emissions. Finally, more motorists need to step out from their car and choose an alternative way of travelling whenever possible.

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PUBLIC TRANSPORT AND THE CYCLE ARE PERFECTLY SUITED TO A CITY

In Gothenburg, about 25 percent of journeys are made by public transport and ten percent by bike. It should be a lot more, since a big city, with all its people, provides excellent conditions for walking, cycling and using public transport. We are far behind, for example, Stockholm and Oslo, where about 40 percent use public transport. Today there is wide agreement between all political parties and municipalities in the Gothenburg region that we, too, shall reach a 40 percent share.

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It is lack of time that is often behind the choice of taking the car. As an alternative, therefore, there is a need for efficient public transport on longer distances with good connections to local traffic, cycle and pedestrian paths for the last stage to the destination. Occasionally, it's more a case of habit that makes us travel in this way, year in and year out. Half of all journeys by car are, for example, less than five kilometres, a moderate cycling distance.

The cycle has all the environmental advantages – non harmful emissions, no climate effect, it takes up little room and it is silent. Gothenburg has become an increasingly cycle-friendly city with more cycle paths, cycles parking facilities and cycle-borrowing in the city. Compared with other types of traffic, the investments are small but the environmental benefits are great. In central Gothenburg, the cycle is often the fastest alternative. In order to attract many people, the cycle needs to occupy an even bigger place in the city.

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Read more on page 25

OUR GOODS – BY ROAD, WATER OR RAIL?

It's not only people who need to arrive at their destinations in Gothenburg, but also all goods. Gothenburg has the biggest port in the Nordic region which not only means a lot of shipping but also extensive land-based transport. From a climate perspective shipping, combined with rail, is the best transport alternative since both vessels and trains can carry large goods volumes in an energy-efficient manner. On the other hand, shipping emits large amounts of air pollutants, causing acidification in lakes and on the ground. Shipping is international and thus global agreements, which have proved to take a long time, are often needed in order to solve environmental problems. By concentrating on vessels in the Port of Gothenburg being connected up to shore side electricity, we then reduce the vessel's noise and emissions locally.

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LOCAL ENVIRONMENTAL OBJECTIVE: CLEAN AIR

"The air in Gothenburg shall be so clean that it neither damages people's health nor gives rise to recurrent problems."

IT IS PRIMARILY THE ROAD traffic that affects the air quality at street level. Despite emissions decreasing, we are meeting neither the law's standards nor the environmental objective at many places in central Gothenburg. This means, in effect, that many people are exposed to air pollution levels that affect their health negatively.

Particulate matter and ground level ozone are the air pollutants which have the greatest impact on health. We have quite a good opportunity of lowering the particle concentrations by, for example, reducing the use of studded tyres and introducing speed limits. Most forms of air pollutants require us to choose more environmentally-friendly forms of transport and for the European emission standards governing new vehicles' exhaust emissions to be sufficiently tough. The need for international cooperation for ground level ozone, which is primarily due to ozone-rich air from the continent, is particularly clear.

In order to achieve the objective of Clean Air, it is necessary to reduce emissions from transport, for example, by an increased proportion of public transport for passenger travel and more rail transport for goods. Even though road traffic dominates the air quality at street level, it is important that other major emitters such as shipping, industry and the energy sector do what they can in order to reduce their negative effects.

LOCAL ENVIRONMENTAL OBJECTIVE: NATURAL ACIDIFICATION ONLY

"The acid precipitation and acidifying effects of the management of forestry grounds shall be kept below the limit of what the ground and water can tolerate."

THE GOTHENBURG AREA is currently greatly affected by acidification. This is partly due to acid precipitation still being heavy and partly because our bedrock has a poor ability to neutralise the acid precipitation.

The acidifying emissions are decreasing in Gothenburg, particularly for sulphur dioxide. But the acid precipitation, which is primarily due to emissions from other countries, has not decreased sufficiently and the recovery of the ground and water proceeds slowly. We still need to treat most of the lakes in the Gothenburg municipality with lime in order to preserve fish and other biological life. The City of Gothenburg owns and administers half of the forest lands in the municipality and thus has major opportunities for conducting forestry which does not contribute to acidification.

In order to reduce the acidification, internationally reduced emissions are necessary. The contribution by emissions from shipping is considerable and further work is necessary in reducing the sulphur content of ships' fuel, increase the nitrogen cleaning and the proportion of shore side electricity. Road traffic also needs to reduce its emissions.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

K2020:

DOUBLED PUBLIC TRANSPORT IN THE GREATER GOTHENBURG AREA

BETTER PUBLIC TRANSPORT is perhaps the single most important issue concerning the reduction of climate change, improved air quality and, now, other environmental improvements in Gothenburg. By means of the K2020 scheme, the Gothenburg region's 13 municipalities, together with the Swedish Transport Administration, have produced a strategy for how the number of public transport journeys is to increase. It is expected that the total amount of travel will increase as the Gothenburg area grows. The entire increase in travel is expected to be absorbed by improved public transport. This should increase the proportion of public transport travel from the current barely 25 percent to 40 percent, representing almost a doubling of the number of journeys.

Thanks to K2020 there is now broad political agreement and a clear picture of what is needed to increase public transport traffic in the Gothenburg region. In order to get there, public transport needs to be quick, simple, reliable, safe and secure. There need to be more and better commuter train lines which are joined up by a tunnel beneath Gothenburg (the West Link), with opportunities for alighting at more stops in Gothenburg. Inside Gothenburg, public transport traffic can increase with more tramlines and new routes for buses. The travel must also be flexible with good real-time information about the traffic situation and a simple fares system.

In order to achieve a doubling of public transport traffic, major investments will be needed. An infrastructure package partly paid for by congestion charges has meant that K2020's aims now look capable of realisation.

Read more at www.k2020.se

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

TRUNK CYCLE LANES:

"MOTORWAYS" FOR CYCLISTS

GOTHENBURG HAS LONG since aimed at achieving an integrated network of cycle paths. A few years ago cycle lanes were also formed in order to meet extra high demands of accessibility, safety, maintenance and priority for cyclists. These cycle lanes are called trunk cycle lanes and are a kind of "cyclists' motorways".

The trunk cycle lanes shall be wide and direct, have good lighting, dangerous obstacles shall be removed and snow-clearing and de-icing shall be given high priority. If you find yourself on a trunk cycle lane, you shall know that the cycle journey will flow. Several of the stretches also have a cycle barometer showing how many have gone past during the day. The latest addition involves placing detectors in the ground, enabling the cyclist to avoid stopping and having to press for a green light. The first four trunk cycle lanes go from the city centre to the middle of Hisingen, Partille, Mölndal and Älvsborgsbron.

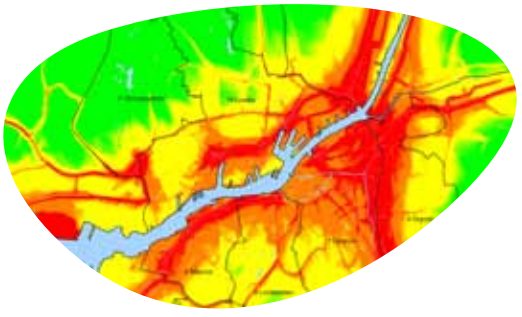
The first four trunk cycle lanes in Gothenburg

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

AIR MONITORING:

SEVERAL WATCHFUL EYES CHECK THE AIR

EACH MUNICIPALITY must check air quality. In Gothenburg there are several fixed monitoring stations and mobile monitoring stations that measure air quality all day. If you want to see what the air quality is like right now, or access listings of the measurements, you can visit the city's website. Here, too, are calculations each year presented in map form so that it is easy to see where the air quality is good or poor.



The red area does not meet the law's air quality standards for nitrogen dioxide (average daily value for 2009)

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

NOISE – A PROBLEM FOR A RELAXED CITY

Noise is an extensive environmental problem that affects many people. Living in a noisy traffic environment can lead to sleep problems, irritation, headaches and even blood pressure can be affected. Around 17 000 people living in Gothenburg are estimated to suffer excessive noise levels at their homes (over 65 dBA). However, a lot has already been done to improve their sleep at night through constructing noise barriers and replacing windows. A good sound environment where one can relax requires there to be fewer vehicles outside the window, for them to be quieter, drive more slowly or for the road surface to absorb the sound better.

When new housing is built in Gothenburg, a municipal application of standards for traffic noise must be followed. No homes may be built with excessive noise levels (over 65 dBA) outside the window but, in fact, the noise should be still lower if, for example, you want to open the window without being disturbed. In order to build new homes in Gothenburg where the noise can be disturbing (above the 55 dBA standard), it is necessary for the home to be planned so that it is possible to arrange sleeping places on a quiet side, e.g. overlooking a yard. The home shall also be positioned close to public transport, so that those who move in are not dependent on cars and thereby create even more noise.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

BIKE-BORROWING – SPONTANEOUS CYCLING THAT YOU CONTROL YOURSELF

There are now bike-borrowing locations in central Gothenburg where many people pass by and where it is close to public transport junctions. The idea is that it shall be easier for both regular cyclists and infrequent cyclists, both Gothenburg residents and tourists, to get around the city by bike. The cycle is collected at a station and deposited at another at the end of the journey.

When the bike-borrowing system is fully developed in 2013, there will be 1 000 cycles in central Gothenburg, at no fewer than 60 stations and at 300-500 metre intervals.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

CLEAN VEHICLES: THE CHOICE OF CAR AFFECTS THE CLIMATE

Since the start of the 21st Century, the number of clean vehicles in Gothenburg has grown from a few hundred to tens of thousands. In the City of Gothenburg, the target of 90 percent of cars being clean vehicles was reached in 2010.

The biggest environmental gain from choosing a clean vehicle is that the climate-affecting emissions decrease. It can, for example, be due to the fuel not being petrol or diesel but being replaced by ethanol or bio-gas produced from biological material. Really fuel-efficient cars can also be environmentally-adapted even if run on petrol or diesel since the emissions into the atmosphere are so small.

The so-called "pump law" has meant that there are environmentally-friendly fuels at all major filling stations in Sweden. It is usually ethanol that is sold. In western and southern Sweden, there is good availability of bio-gas which, in many ways, is a good environmental alternative. In addition to bio-gas not adding to the greenhouse effect, it can be produced from resources which had not previously been utilised. Examples of this are anaerobic digestion of sewage sludge, compost or dung. Gas cars also have extremely small emissions of harmful substances into the atmosphere.

In the Gothenburg area, there are plenty of places where you can fill up with CNG-gas, which is a mixture of bio-gas and fossil natural gas. If you want to be extra environmentally-friendly, you can arrange a GreenGas agreement which is comparable to the green electricity principle. This means that when you fill a certain amount of motor gas at a filling station, the quantity is reported and a corresponding volume of bio-gas is filled into the system.

Read more at www.miljofordon.se

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

CONTAINER SHUTTLE TRAINS A SUCCESS

HEAVY ROAD TRAFFIC is particularly noticeable in Gothenburg, which has the biggest port in the Nordic region and a lot of industry. The transport sector has increased climate emissions for a long time and the traffic involving heavy goods vehicles is no exception. Heavy goods traffic also affects the city's local environment with poor air quality, noise and crowding. But there are examples which indicate that it is possible to break the trend – rail shuttles to and from the port is one such.

The Port of Gothenburg is investing heavily in increasing the proportion of goods carried by train. In 2000, a total of 22 percent of all containers were transported to and from the port by train. In 2009, the proportion had passed 50 percent. This positive development is due to a system of rail shuttles that the Port of Gothenburg has built up together with railway operators and others.

Ten years ago, the first rail shuttle started. Today there are 26 rail shuttles running daily to 23 cities in Sweden and Norway.

Read more at www.portgot.se

NATURE

A NATURAL PART OF THE CITY

Gothenburg is sometimes referred as the city of parks. As much as a hundred years ago, the people of Gothenburg were far-seeing enough to create large and beautiful parks, such as Slottsskogen. And the need for places for picnics, games, exercise and beautiful views has hardly diminished since then.

IN THE FUTURE we will build on former large port and industrial areas on both sides of the river, in the middle of Gothenburg. But before thousands of homes and workplaces fill out the area we need to stop and ask ourselves the question: Where can we create new green park areas in a rebuilt and more densely built centre?

In addition to all the parks and the intermingled greenery that already exists in the middle of the city, there is also a fantastic variety of types of nature to be found in Gothenburg. In eastern Gothenburg there are large forest areas with small lakes, as in the Vättlefjäll and Delsjö area. Hundreds of thousands of people find their way here each year.

RICH NATURE IS WORTH PROTECTING

In Gothenburg many valleys with streams converge and then join up with the mighty river. One example is Säveån which boasts a unique salmon stock. Another is the Lärjeån valley which also possesses high natural value. The Göta river then finds its way out into the sea with all the myriad islands. On Hisingen there is everything from open sea to agricultural land and wetlands. There in the small lakes and ponds you can find the Great Crested Newt, protected under the EU species and habitat directive.

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There are great natural riches in many of these areas. Several nature areas are now protected, but in order to preserve the biological diversity in the longer term more areas need to be saved as Gothenburg constantly grows and changes. Even small green areas can be of great importance for those who live nearby or for individual plant and animal species. Where there is new construction we need to be careful to ensure that valuable natural and recreational riches do not disappear.

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Unique species are not only to be found in what we would normally regard as nature. We have sometimes unintentionally created conditions for animal life in such places as roofs, golf courses, tunnels and screened areas between roads and industries. Correctly carried out, a growing city can both preserve natural riches and provide room for increased biological diversity.

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THERE'S SOMETHING HAPPENING BELOW THE SURFACE OF THE SEA

One of Gothenburg's greatest assets is its proximity to the sea with saltwater baths, windswept nature and splendid boat trips. But something is about to happen. We know that when land-based nature changes we often react quickly. In the sea it is not so easy to see how Man is changing the environment. The sea also benefits us in ways that we never consider. Through the production of oxygen, recirculation of nutrients and the storage of carbon-dioxide.

The people of Gothenburg affect the sea in many ways, such as through discharge, shipping and leisure craft. Along our coast there is a lot of vulnerable animal and plant life such as eelgrass beds, which serves as a nursery room for some of the fish. The eelgrass is now threatened by excess eutrophying substances. There is much to indicate that the environmental imbalance in the sea represents a really big challenge to us. We need to take marine life much more seriously at many levels of society.

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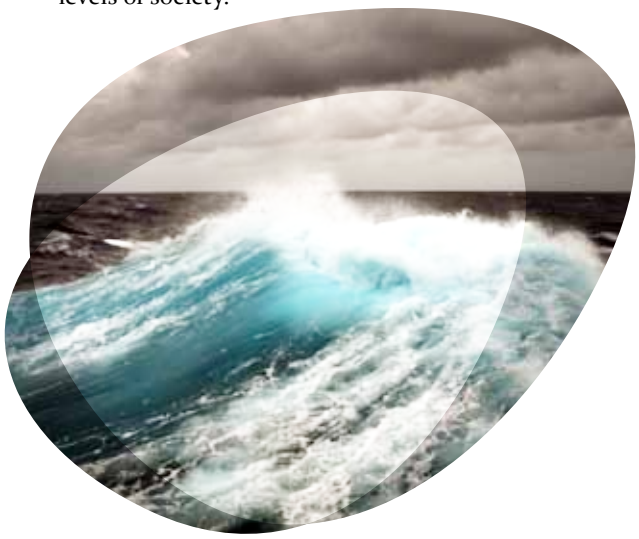
Read more on page 33



HOW DO WE ACHIEVE A GREEN CITY?

TODAY GOTHENBURG ALREADY has fantastic parks and green areas. The City of Gothenburg cares for, and develops, most of the parks and natural areas and, in addition, owns large parts of the forest, water and even cultivated land in the municipality.

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An important task for the city is to develop and lay down new green areas so that all the city's inhabitants have an opportunity to enjoy greenery close to where they live. When new housing is built its closeness to places where you can walk and relax has to be a natural consideration. The green areas that already exist also need to be cared for, developed and made even more accessible than now. This is partly to enable us to enjoy the greenery, but also because they have considerable natural value. For those areas that are primarily used for forestry the care needs to be more directed at nature conservation.

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HOW DO WE GET A BLUE CITY?

EVEN THOUGH GOTHENBURG has a lot of lakes, waterways and sea, it is often difficult to get to the water in practice. The port area, industries and private sites often block the ways to the water for those who want to enjoy the sun and to bathe next to the beach. Even if the dream for many of us is to live in a house with its own beach, the present-day shore protection areas by the sea and lakes means a lot for a major city like Gothenburg. In the same way that the rights of public access in forests and on the land make Sweden unique, it is important to protect the opportunity for everyone to be able to share the water's pleasures. Along Gothenburg's many watercourses there is also a great potential for creating pleasant and hill-free stretches for walking and cycling.

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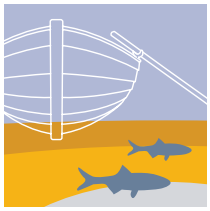


LOCAL ENVIRONMENTAL OBJECTIVE: A BALANCED MARINE ENVIRONMENT

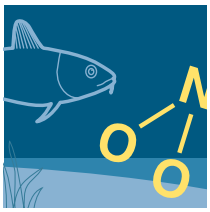
"By 2015 the coast and sea in Gothenburg shall enjoy good conditions for a rich biological diversity and have good accessibility for recreation."

THERE ARE MANY SIGNS today of a large-scale change and an ecological imbalance in the sea. Eutrophication, over-fishing and climate change are some of the biggest threats, together with the spread of alien species and toxic substances. The sea has also shown itself to suffer acidification due to an increased carbon-dioxide content in the atmosphere. Along the coast, moreover, the pressure from construction and tourism is increasing.

In order to regain a balanced marine environment there is a need for fishing to be controlled. For example over-fishing and damaging fishing methods, such as far too excessive bottom trawling, should be halted. More marine areas also need to be protected. The spread of alien species that can be traced to the ballast water of vessels or from hulls, damages the marine environment, as does the discharge of toxic substances, oil and toxic marine paints from shipping. Many of these problems can be solved at the international level by us agreeing on joint rules and observing them.

Littering also affects the sea. The sea now contains large volumes of everything from visible waste to microscopic plastic fragments that risk affecting marine life.

In Gothenburg the large number of pleasure craft also affect our marine environment. In the marinas the situation can be improved, partly by means of flushing plates that cleanse toxic hull paints and partly by installations that accept toilet waste that would otherwise be released, untreated, into the sea.



LOCAL ENVIRONMENTAL OBJECTIVE: ZERO EUTROPHICATION

"The discharge of nutrients to land and water in Gothenburg shall not have any negative effect on people's health, the conditions for biological diversity or the opportunities for all-round use of land and water."

Eutrophication is primarily an environmental problem in the sea, but in many lakes and watercourses as well. It is primarily the elements phosphorous and nitrogen that cause eutrophication. The eutrophying substances can come from waste water treatment plants, leakage from agricultural land and air pollutants. In Gothenburg the biggest discharge into water is from the Rya wastewater treatment plant, but agriculture, industries and other sources also contribute. When it rains the surface water with nutritive substances ends up in waterways and the sea. With really strong rainfall, polluted wastewater is also discharged. Improved waste water management and a better wastewater system can reduce discharge in Gothenburg. Another measure is to improve and create wetlands which, in addition to being habitats for plants and animals, can cleanse and even out the water flows.

LOCAL ENVIRONMENTAL OBJECTIVE: FLOURISHING LAKES AND STREAMS

"Lakes and watercourses' biological, ecological, social and social history values shall be preserved while, at the same time, the raw water access is secured."

In Gothenburg there is plenty of fresh water in the form of about 70 lakes, the Göta river, several big streams and around 50 brooks. These waters are often affected by eutrophication or acidification, depending in part on what type of land and environment there are around the water. The acidification has affected the original plants and animal life. Unless the majority of the lakes in Gothenburg have lime added, fish and other forms of life could be completely eradicated. In several watercourses there are obstacles that need to be removed in order to allow the fish free migratory paths. The Göta river is Sweden's most water-rich and is a watercourse with many species of fish. Vessel traffic affects the plant-life on the bottom with wave surges and erosion, but the greatest threat to life in the river occurs if there are accidents involving dangerous discharges.

Many valuable lakes and waterways would need to be made into nature reserves in order to protect them in the longer term. Lärjeån has been designated as being of national interest for the purposes of nature conservation and is of particular value for fishing. Säveån is important for salmon and sea trout to be able to reproduce. Mölndalsån was previously greatly affected by discharge and completely devoid of fish. Thanks to an extensive environmental and fish protection initiative, fish are again to be found in the river.

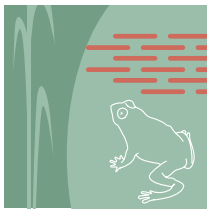
LOCAL ENVIRONMENTAL OBJECTIVE: SUSTAINABLE FORESTS

"The forest's social values, cultural environment values and biological diversity shall be protected and developed at the same time as biological production is maintained."

With today's modern forestry the biological diversity has decreased in line with the disappearance of marsh forest, deciduous forest and old forest. Factors such as forest pasture and forest burning benefit growth and animal life in the forest, but are now uncommon. With more protected areas and forestry that is conducted with greater consideration given to nature, high nature values should be able to return. One step in the right direction is the certifying of forest that the City of Gothenburg and some private forest-owners are undertaking.

Half of the municipality's forest is not used for forestry but has been saved for recreation, open-air pursuits and nature protection and is tended with a lot of care given to nature. For example deciduous trees are consciously spared and dead trees and branches are left behind after thinning or felling, benefiting mosses, larvae, fungi and insects.

About 90 percent of the people of Gothenburg have visited a nature area over the last year. The most popular is the Delsjö area with a million visits a year, but Sandsjöbacka and Vättlefjäll also attract visitors in their hundreds of thousands. In order for more city dwellers to be able to enjoy the forest we need still more information, maintenance and new installations, such as paths suitable for the disabled.



LOCAL ENVIRONMENTAL OBJECTIVE: A VARIED AGRICULTURAL LANDSCAPE AND THRIVING WETLANDS

"Nature, culture and social values in Gothenburg's cultivation landscape and wetlands shall be preserved and developed at the same time as the production ability is sustained."

In recent years the proportion of agricultural land, primarily pasture land, has grown in Gothenburg. This concerns, not least of all, pasture from horses. It is positive that the lands are held open, but altered ways of using them have led to many species finding it harder to survive in modern and large-scale agriculture. It was much more usual before to have flowering meadows and pastures, stone walls, boundary markers and old paths. These types of environment were habitats for many animals that today are under threat. Poisons that are used in cultivation also damage the biological diversity. The City of Gothenburg has, for many years, had the goal of buying more ecological food, that is, food that has been cultivated without the use of chemical pesticides.

Wetlands have been historically drained away and have disappeared to make more land for cultivation and forest plantation. But without wetlands the water is not retained in the countryside in the same way and the faster flows carry the nutritionally rich water with them, resulting in eutrophication. The lack of wetlands also means a lack of life environments for aquatic organisms. In recent years new wetlands have been laid down in Gothenburg, but more are needed.

LOCAL ENVIRONMENTAL OBJECTIVE:
A RICH DIVERSITY OF PLANT AND ANIMAL LIFE

"Gothenburg shall have an attractive and varied landscape with a preserved diversity of animals and plants."

COMMON TO ALL NATURE in Gothenburg is that it can be a home for a rich plant and animal life, something referred to as biological diversity. Sometimes it is easy to forget how dependent we are on nature. It not only provides us with direct benefits in the form of food, timber and fuel, but also gives us inspiration and relaxation. Nature also has many important functions such as controlling the local climate, creating oxygen and the pollination of plants by insects. It is even harder to predict the benefit of biological diversity in the future, such as the genetic variation that has been developed on the earth over billions of years.

In order to preserve a rich plant and animal life in Gothenburg we must show greater consideration for forestry, agriculture and fishing, for example. Many threatened species are dependent on how we have previously used fields, forests and other land. The overgrowing that occurs when the land is allowed to go to waste often means that major natural riches disappear. In a growing city such as Gothenburg there is a great danger that the land is totally altered when it is developed. Through the building of roads, industries and housing areas the ground is often made hard, whereby the surface water no longer filters through the earth but quickly runs off into lakes and streams instead. This not only destroys the life environment for plants and animals but also creates barriers that prevent spreading and genetic exchange. As Gothenburg grows we have to build so that it is not only people who flourish.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

COMPENSATORY MEASURES

NEW CONSTRUCTION TO BE CONSIDERATE TOWARDS NATURE AND FAVOURITE PLACES

JUST IMAGINE IF THE PLACE where we are putting up new buildings is someone else's favourite place for playing football, sunbathing or enjoying the view? Maybe the location was rich in unusual plants or was a winter refuge for a threatened species of animal?

This is the kind of mistake that the City of Gothenburg wants to avoid by means of the programme *Compensatory measures for nature and recreation*. By means of what are termed sociotope maps that show how the land is used by the people of Gothenburg, we gain a good overview. Moreover there are constantly more inventories being made of where threatened plants and animals live.

The ideal position would be for no valuable natural and recreational areas to disappear when there is new construction in the city. If this isn't possible then the aim is to minimise the damage or at least compensate the riches that disappear by recreating them. Sometimes it is easy to compensate. A new playground replaces an old one. At other times it is significantly harder. The aim still remains that of replacing what is lost by something of equal value.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

OUT AND ABOUT IN GOTHENBURG'S NATURE!

GOTHENBURG HAS FANTASTIC natural areas where you can enjoy the leaves sprouting, bathe, pick fungi or go skating. In order to encourage more people into the countryside the city has prepared some excursion destination tips. On the City of Gothenburg website, www.goteborg,se, you will find the Service Guide where, for example, you can read about Gothenburg's nature areas. Here you have descriptions, maps and stops for a score of nature's pearls.

The brochure *Out and about in Gothenburg's nature* is available at libraries and tourist offices in Gothenburg and can be downloaded from the city's website. In it you can read about big and popular areas as well as the smaller and less well-known places. Each natural area is presented in the brochure with text, maps and symbols for attractions, illuminated ski-tracks and viewing points.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

THE FRESHWATER PEARL MUSSEL IN LÄRJEÅN – UNCOMMONLY FASCINATING

THE LÄRJEÅN IS A WATERCOURSE in Gothenburg abounding in natural riches. In addition to a thriving birdlife with, for example, kingfishers and fish in the shape of salmon and salmon trout. there is also a stock of the unusual freshwater pearl mussels.

The freshwater pearl mussel is a good and fascinating example of how sensitive and complex nature can be. In order to survive, the river pearl mussel is dependent on the water's quality, the correct fish stocks and much more. With the right conditions it can live for as long as 100 years.

In Gothenburg different players have worked together in improving the conditions for the mussels in Lärjeån. In a few years these measures will be followed up and then we shall see if new mussels have been added.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

THE BUTTERFLY – A BEAUTIFUL AND FAMILIAR INDICATOR

HOW DO WE KNOW IF plant-life and animals thrive in Gothenburg? What shall we do to ensure that future generations shall have a knowledge and appreciation of nature? The answer is simple: Butterflies. An environment where many butterflies thrive is an environment where many other plants and organisms that are worthy of preservation also thrive.

The City of Gothenburg has set up a goal whereby the number of butterfly species shall be maintained or, even better, increased. This has, for example, resulted in a butterfly project where pre-schools, schools and other players take part. Butterflies have proved to be a successful gateway for generating children's interest in nature. Now butterfly plants are being sown, butterflies photographed and species identified.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

WASH DOWN THE TOXIC MARINE PAINTS CORRECTLY

GOTHENBURG HAS SOME of Sweden's biggest marinas. But boating demands a lot of consideration and acceptance of responsibility, if future inhabitants are to enjoy a sea that is healthy and full of life.

All boat-owners have a responsibility to ensure that toxic antifouling paints do not end up in the sea. The most toxic paints are now banned in Sweden but, despite this, damaging marine paints are still sold sometimes. Among the banned paints poisons such as tributyltin (TBT) can be found. TBT not only affects the organisms and plants that attach themselves to the hull, but also spread throughout the entire marine system from sediment to marine creatures. Particularly hard hit are certain gastropods that can no longer reproduce themselves when exposed to TBT.

Even approved antifoulings contain poisons. That is why it is important for boats to be washed and scraped in the correct manner. There are now flushing plates with cleaning of the waste water in several marinas and the aim is for all marinas in Gothenburg that take up more than 50 boats a year, shall install such equipment.

CONSUMPTION

THE ENVIRONMENT IS DEPENDENT ON WHICH GOODS WE CHOOSE

Even the most home-loving Gothenburg citizen affects the environment beyond the city's limits. Most of the goods we consume are produced somewhere else. Globalisation and increased trade in goods mean that our choice of goods plays an increasingly important role for the environment. It is not always so easy to do the right thing by the shop shelf, the recycling station or the travel agent, but your choice makes a difference and there is good advice available.

MODERN SOCIETY HAS MEANT that nowadays we know barely anything about the origin of the food, clothes and other things that we buy. During a commodity's life cycle – from cradle to grave – there is an environmental impact. It can be about how the raw materials are produced and processed, how the goods are manufactured, transported, bought in and used by us, right up to when they finally become waste. At several of these stages there are emissions, poisons are used and energy and other resources consumed. It means that other places and people are, to a high degree, affected by which goods and services you and I choose.

WHOSE RESPONSIBILITY IS IT?

It is easy to feel inadequate in the face of environmental problems such as climate change, spread of poisons and environmental degradation in developing countries. Nobody can solve these problems alone, but we all have an opportunity to involve ourselves in influencing the development.

For each and every one of us to be able to help there have to be good alternatives in the form of, for example, environment-friendly ways of travelling, environmentally labelled goods and somewhere to deposit our sorted waste. The responsibility rests primarily with politicians, businesses and other organisations. But in order for the environmental improvements to have a real effect, the way in which we choose to shop, eat, live and travel is still crucial.

THE IMPACT OF CONSUMPTION ON THE CLIMATE

If we want to assess how our consumption impacts on the climate, it is more reasonable to take a look at the emissions we cause at a global level, rather than where we live. The impact on the climate by an average Swede will then be at least 25 per cent higher than if we just consider the emissions within Sweden. It is true enough that we export goods that are consumed in other countries, but imports and travel abroad causes even greater emission of greenhouse gases.

The average Swede's climate-impacting emission is about 10 tons of carbon-dioxide equivalents per year. If the Earth's temperature increase is to be manageable then the emission level needs to come down to below two tons within the next 40 years. What, then, do we need to do in order to reduce our impact on the climate to a fifth of what it is today?

Our emission level depends on how we buy, eat, live and travel. Most of the impact derives from our travel and housing with about a third of the emissions from each, while our food consumption accounts for around 25 percent and our purchases of other goods for 15 percent. Naturally the variation is considerable between different groups and individuals. But it is still possible to identify five different activities which, together, account for around half of the total emissions. How much we drive, and in what kind of car, as well as how long and how often we fly, have a significant impact. How we heat our homes and how much electricity we use, also belong to the major emission items. And, finally, the amount and choice of meat has a considerable impact. The consumption of beef has extra strong climatic effects due, to the emission of methane which is a powerful greenhouse gas.

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YOU BUY POISONS MORE OFTEN THAN YOU REALISE

TOXIC SUBSTANCES are to be found in all kinds of goods, such as clothes, furniture and computers. The volume and number of chemicals is constantly increasing. In 50 years production has grown from less than ten million tons to over 400 million tons a year. This is happening while, at the same time, we actually know very little about the effects and where these poisons finally end up.

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As a consumer it almost impossible to know all the risks and substances you should avoid. In this regard manufacturers and shops have a big responsibility in ensuring that the worst products never end up on the shop shelves. Individuals and organisations can also contribute by asking for toxic-free alternatives and making sensible purchases. For several years the City of Gothenburg has prioritised the goal of *The share of sustainable meals served by the municipality shall increase*, which means that the share of ecological food at pre-schools and schools shall increase in Gothenburg. Since children are more sensitive to poisons it is extra important for their environment to be improved.

Where do all the poisons finally end up? The effects are worst when the substances have a long lifespan and can be stored in humans and animals. Substances such as DDT and PCB have long been banned, but we can still come across them in our environment. Poisons from old industries can be found as soil pollutions or as sediment pollutants in the Göta river. Many of the poisons we absorb via food, or in some other way, end up in the sewage sludge. Fortunately enough the presence of most of the known poisons in the sludge is decreasing, but since new types of poisons are being added all the time, we must continue to be on our guard.

BUY WISELY AND RECYCLE MORE

A CLEAR MEASURE of our consumption is how much waste we throw away. Since 1960 the annual waste volume has grown from less than 200 kilos to over 400 kilos per person in Gothenburg. In good times the amount of waste increases directly, only to fall off with economic downturn. This trend is unsustainable in the long-term and the question is whether increased affluence has to mean increased waste volumes? One way of breaking the trend would be to recycle more, buy better quality and try to repair things before resorting to the dustbin.

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But even if waste has grown a lot, we are still better today at sorting out and dealing with out waste. The usual types of waste are now incinerated, instead of being put on the Landfill, and the heat is converted into district heating and electricity. But not everything ends up in the waste bag. The people of Gothenburg sort out around 20 percent of their waste as return paper or packaging and about five percent is thrown away as biological waste for composting. It should be possible to sort out still more. Random analyses that are conducted every year show that around a third of what ends up in the usual rubbish bag should be able to be composted and as much again recycled.

It is extra important to sort out hazardous waste since it contains toxic substances that should not be released into the environment. These can, for example, be light-bulbs, chemicals, paints, solvents, car batteries and smoke alarms. Hazardous waste is accepted by the hazardous waste truck or at environmental stations that are located at filling stations in and around Gothenburg. Some hazardous waste can also be placed in the "collector" at several large shops. More precise information about where to leave hazardous waste can be found at www.goteborg.se.

How are we to do environmentally-friendly shopping?

Nowadays there is plenty of environmental labelling of goods. The labelling requirements and scope are also constantly increasing. Where food is concerned there are many different kinds of environmental labelling to show that the goods have not been produced with the use of chemical pesticides, artificial fertilisers or genetically modified organisms. Occasionally there are also animal welfare requirements and increasingly often those relating to climate impact. On other goods and services the Bra miljöval [Good Environment choice] and the Nordic Swan symbol show that strict environmental requirements are met. All household appliances, such as refrigerators and washing machines, have clear energy labelling these days. Special labelling is also present for forest products, fish and much more. If you want to be certain that the goods you buy have been produced under good conditions for the workers, the Fairtrade label can also be chosen.

Other ways of doing environment-friendly shopping is to buy high-quality goods so that they last longer, or shop second-hand which can, by the way, give you quite different qualities than those from normal shopping.

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LOCAL ENVIRONMENTAL OBJECTIVE: A NON-TOXIC ENVIRONMENT

"Gothenburg shall be so non-toxic that neither people nor the environment are adversely affected."

ONE OF THE BIGGEST problems in achieving a non-toxic society is the lack of knowledge regarding chemical substances' properties and dissemination. Without that knowledge it is impossible to know entirely the way in which substances can damage people's health and the environment. Yet another uncertainty factor is what is referred to as the "cocktail effect", that is to say, the effect of being exposed to several poisons simultaneously.

In order to gain control over the situation there will be a need for international agreements. The EU's chemical legislation, REACH, marks an improvement, but further steps are needed.

But even if today's legislation is inadequate, there is an entire chain of players that can help towards us having fewer poisons in the environment. Businesses have a huge responsibility when they select substances in their development of goods. Shops have a responsibility for the goods they sell being approved and clearly labelled. Those buying goods and services also exercise strong influence, in particular major public and private organisations. But even conscientious consumers and environmental organisations can help to push the development towards a non-toxic Gothenburg.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

ENERGY ADVICE

SAVES MONEY AND THE ENVIRONMENT AT HOME

KONSUMENT GÖTEBORG'S ENERGY and climate advice service provides pointers about heating, electricity agreements, economising tips and construction.

Heating accounts for the greatest proportion of energy consumption in your home. If you live in a house, are a tenant-owner or live in a rented flat, you can get information from the energy advice service about heating pumps, solar energy, bio-fuels, wind-power and district heating. Another possible way of saving both money and the environment is to take a look at your electricity agreement.

If you intend building a new home or an extension, good advice is of extra importance.

When you build a new home you can influence the energy consumption and energy costs for a long time to come. It can, for example, concern a choice of insulation, windows, ventilation and heating system – choices that often endure throughout the entire life of the building. There can also be various incentives available if you change your energy system, providing even greater motivation for environmental friendliness.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

LIVE SUSTAINABLY – TIPS FOR THOSE LOOKING FOR ENVIRONMENT-FRIENDLY CONSUMPTION

IF YOU ARE TRYING TO PURSUE an environment-friendly life, there are plenty of tips to be had. On the City of Gothenburg website there is a listing of both tips and links under the heading "Leva hållbart" [Live sustainably]. There are tips here for both the beginner and the environmental expert.

You can, for example, learn how you can live and act with greater environment-friendliness. What you need to do to make your home more energy-efficient or to sort your waste better. How to clean your home or car without using dangerous chemicals.

You can also get tips on how to make your travel more environment-friendly. Perhaps you are ready to start cycling, use public transport or car-share? If you are dependent on your car there is still a lot you can do through driving economically and checking tyre pressures – or why not join a carpooling scheme? Planning your holiday? Perhaps ecotourism or train chartering is worth considering?

If you also want to eat with a good environmental conscience there are tips about sustainable fish stocks available, or you can get recipes for vegetarian dishes. You can also save money and the environment by shopping online. Shopping online with home delivery reduces transport loading, compared with all the customers driving themselves to and from the shops.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

NON-TOXIC GOTHENBURG – WHAT GOODS SHOULD BE LOOKED OUT FOR?

FOR SEVERAL YEARS NOW the environment administration has been conducting a project known as "Non-toxic Gothenburg", aimed at reducing dangerous chemicals in goods. The result of surveys and samplings of various products has led to many customers and businesses being sceptical. Here are some examples of products you advised to avoid.

Sports clothing and shoes that contain *silver* as an anti-bacterial agent have become popular in the shops. The problem is that silver is a metal which, when ionised, possesses environmentally damaging properties and is acutely toxic for aquatic organisms. As a consumer you can avoid textiles and clothes that are marked "anti-bacterial", "bactericidal" or "anti-odour"

In toothpaste, too, there can be environmentally dangerous antibacterial substances, in the form of *triclosan,* although it is not necessary if you have healthy teeth. The substance has also become increasingly common in deodorants and brand name perfumes. As a consumer it is imperative to read the ingredients to see whether triclosan is included.

When you buy clothes with print on them, they often involve what is called *phthalates* in order to soften up the plastic print. Many serious health effects are associated with phthalates such as, for example, disruptions to the body's hormone system which can inhibit gender development and fertility. When the garments are worn out the poison can, for example, be spread as dust that is inhaled. Instead choose environmentally marked textiles and avoid the dangerous softening agents.

The most important thing is for children not to be exposed to poisons, as they are more sensitive than adults. Children often explore the world about them by putting things in their mouths, making the risks even greater.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

THE RECYCLING PARK – A "RE-USE CENTRE"

THERE ARE FIVE RECYCLING centres in Gothenburg where you can offload your large waste items, and the most interesting by far is the Recycling Park located in Alelyckan. The Recycling Park is a new kind of recycling centre where items that are deposited can even be repaired and processed and where various recycled products are sold in shops in the park area. The park is a good example of recycling in practice.

As a visitor you will always be asked if you want to give something away or if you have dangerous waste to deposit. The City Mission has a big second-hand shop in the area where furniture, clothes and other things that people have donated, are sold. Also to be found there is Återbruket [The Re-use Shop] where donated building materials, household appliances and other items are sold.

Perhaps you will be able to give away everything you brought with you? In that case you won't have to pay or swipe your ÅVC [Recycling] card and can, instead, wander around and see what you can find amongst what others have donated. You can also visit Returhuset [The Returns House] where there is a shop selling products made from recycled materials and where you can also buy home-made pastries.

! THIS IS WHAT THE CITY OF GOTHENBURG IS DOING FOR THE ENVIRONMENT

THE CLIMATE ACCOUNT: JUST HOW CLIMATE SMART ARE YOU?

WOULD YOU LIKE TO TEST your own climate impact? Enter the climate account and take a climate test to see how you differ from the average Swede or whether you are already living in a manner that is sustainable in the long-term. The results are broken down into home, travel, food and other, making it easy to see where your climate impact is greatest. If you are not satisfied with your result you can also get some tips on how to reduce your own emissions.

Take the climate test at
www.goteborg.se/klimatkontot

Gothenburg and the Environment has been produced by the environmental administration in Gothenburg
Production & Layout: Åttonde Huset advertising agency, www.attondehuset.se
Photos: John Fahlnaes (pages 1, 2, 18, 21, 31, 32, 39), Ylva Löf (pages 8, 12), Mona Lödemel (page 25),
Other photos are from the City of Gothenburg and Åttonde Huset's photo archives.
Environmental Objective illustrations: Tobias Flygar
Printed by: Sandstens Tryckeri

GOTHENBURG'S ENVIRONMENTAL OBJECTIVES

REDUCED CLIMATE IMPACT

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CLEAN AIR

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NATURAL ACIDIFICATION ONLY

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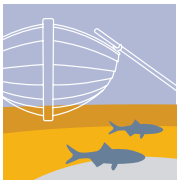

A BALANCED MARINE ENVIRONMENT

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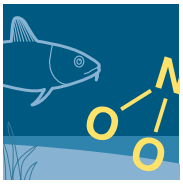

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A RICH DIVERSITY OF PLANT AND ANIMAL LIFE

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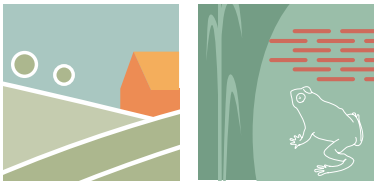

A VARIED AGRICULTURAL LANDSCAPE AND THRIVING WETLANDS

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A NON-TOXIC ENVIRONMENT

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DO YOU WANT TO KNOW MORE?

Thank you for taking the time to read Gothenburg and the Environment. You can find more information on the City of Gothenburg's homepage, www.goteborg.se. Select "Other languages" for an English translation.

If you have any questions or views regarding the environment in Gothenburg we will be pleased to hear from you at the Environmental Administration, telephone +46 (0)31-368 37 00, E-mail miljoforvaltningen@miljo.goteborg.se, website: www.goteborg.se/miljo

GOTHENBURG AND THE ENVIRONMENT

How is the environment in Gothenburg actually faring? What are the city's environmental objectives and what is being done to achieve them?

In this little book you will find answers to these questions and, at the same time, learn more about our era's most important environmental issues.

City of Gothenburg