HEADING FOR A GREENER REGION

GREEN GOTHENBURG
STUDY VISITS — SUSTAINABILITY

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FROM WORD TO DEED

FROM WORD TO DEED That's the necessary step for tackling environmental challenges. The Gothenburg region with its 13 municipalities has plenty of good examples of environmental initiatives. There is great diversity to the environmental efforts, encompassing buildings, travel, nature, consumption, energy and waste. The dedicated work being done is both inspiring and impressive. Despite all the positive work going on, making this a greener region will be a long process, an important step to join forces in this process is the Green Gothenburg project. This is the umbrella for all the good examples in the region and also welcoming visitors to study our achievements.

The *Göteborg Region Association of Local Authorities (GR)* is a regional planning department and an arena for the municipalities that allows an overall approach to development. The 13 municipalities have, among other things, reached agreement on how to achieve our joint objective: sustainable growth. Business Region Göteborg (BRG) is dedicated to strengthening and developing trade and industry in the Gothenburg region. Our goal is to contribute to sustainable growth through cooperation between industry, society and academia. BRG is working towards commercially-driven environmental development and is running a large number of pilot and demo projects in the Gothenburg region, and is responsible for managing Green Gothenburg.

CONTENTS

LOCATION

WHERE SHOULD THE CITY BE LOCATED?

If we are to cope with the environmental challenges of the future, the locations we choose for new construction - for homes, transport and services - are crucial. Only then is it possible to live and travel sustainably and at the same time safeguard unspoiled countryside.

The Gothenburg region consists of 13 municipalities. In 1621, Gustaf II Adolf is said to have picked out where the city of Gothenburg should be located. However, the old fortified city has long since spread outwards and become a metropolitan area, merging with surrounding towns and villages.

The region is growing, and if we undertake new construction in the right way, it will create a basis for living sustainably. All 13 municipalities in the Gothenburg region have agreed on a joint structural illustration. Over one thousand politicians have actively participated in discussions to jointly determine, 387 years after Gustaf ll Adolf - this is where the region should be located!

STRUCTURAL ILLUSTRATION

The municipalities of the Gothenburg region have agreed on a structural illustration showing the main features of the region's physical structures. By planning locally based on the agreement, the regional structure will be realised in the long term. There is strong support for new building developments being concentrated along the main corridors and in the Metropolitan District centred around the Core of Gothenburg, as well as public transport being strengthened there. This provides major benefits, as many people will be within walking or cycling distance of good services and public transport. It also ensures that more land along the coast and more green areas can be spared and be accessible to everyone.

www.grkom.se/english

LOCATION | THE CORE

THE CENTRE OF GOTHENBURG IS FOR EVERYONE

The core of the Gothenburg region is something of a hub and engine for the entire region, with a huge range of workplaces, education options, meeting places, commerce and culture. In the *Structural Illustration for the Göteborg region* the 13 municipalities have agreed that development of the core is a shared mission. For instance, it is in everyone's interest for central Gothenburg to be easy to reach by public transport. Many people want to live and work in the centre of Gothenburg. The regional target is to bring a further 40,000 jobs and 30,000 residents to the core by 2020. Sustainable urban development, not just from an environmental perspective, requires a holistic approach. This is now being implemented with the project *RiverCity*.

LOCATION | RIVERCITY

THE CITY CENTRE IS EXPANDING ACROSS THE RIVER

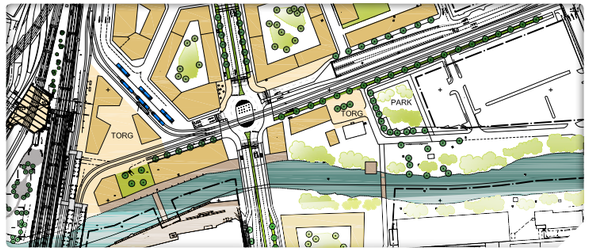
Open to the world – Inclusive, green and dynamic. That's the vision for central Gothenburg, which comes under the name *RiverCity*. One of the most important objectives for RiverCity is to enable the city centre to grow on both sides of the river in a way that ties the city together. The potential is huge, with around four square kilometres of brownfield land and dockland areas. The project team has developed a vision and strategies for this area, as a basis for future planning. The vision has been developed in discussion with Gothenburg residents and through exchange of experiences with other cities. From an environmental perspective, RiverCity opens up huge possibilities and challenges. In order to tackle the climate challenge, the city must be fossil-free and efficient with resources. New construction projects provide a historic chance to "get it right" from the start. If the city centre is tied together across the river and traffic barriers, it becomes more attractive for walking and cycling. With a mixture of housing, workplaces and services linked to public transport, this also reduces the need for travelling. One of the biggest challenges is climate change. The risk of extreme weather, with floods and heat waves, is expected to increase in the future. In this respect attractive green spaces can also provide cooling, and a variety of protection will be needed against high water levels in the river.

www.alvstaden.goteborg.se/english

LOCATION | THE METROPOLITAN DISTRICT

FILLED GAPS AND COMPACT HUBS

Centred around Gothenburg is a metropolitan area that also includes parts of Mölndal and Partille. How can you make such a vast urban landscape more people-friendly and sustainable? In the Structural Illustration, mentioned on page 5, the 13 municipalities have agreed on the principles for achieving this. The metropolitan area already has infrastructure that can be utilised. In places there are gaps with room for new developments, which can give the district a boost and the opportunity to retain services and schools. New developments can strengthen public transport; the very best location is around hubs and interchange points. The *Comprehensive Plan for Göteborg* points out five Strategic Nodes: City, Backaplan, Frölunda torg, Angereds centrum and Gamlestaden. Gamlestaden is one example with exciting development ahead.



LOCATION | GAMLESTADEN

FROM SHIELDED SQUARE TO STRATEGIC HUB

Big plans are being devised for the area around Gamlestads torg. The square once linked up with Gamlestaden, but has long since become an isolated tram stop. In the future it is set to become one of Gothenburg's Strategic Nodes. This means that, in addition to being an important interchange point for public transport, there will be a host of developments in the form of housing, workplaces, commerce and other services in the vicinity. The first step is a station for the new commuter train to Lödöse. A coherent local structure will be combined with hubs for trains, trams, buses and cycles. The second stage will involve demolishing the viaduct, which currently shuts off the square from the rest of Gamlestaden, so that this city district can be unified. From an environmental perspective, it is best to build densely close to good public transport; this provides sustainable travel for large numbers of people. However, building densely increases the risk of noise and poor air quality, which will set major demands in terms of design. One way to make it attractive is to improve access to green spaces and water. One essential basic idea for the development of Gamlestaden is for the Säveån river to have a belt of parkland, starting from Gamlestads torg.

www.goteborg.se

LOCATION | THE MAIN CORRIDORS

THE REGIONAL BACKBONE

Five distinct main corridors run into the centre of Gothenburg, with roads and rail lines, along which the majority of the urban areas in the region are located. The 13 municipalities of the Gothenburg region have agreed that the main corridors must be strengthened in order to provide conditions for sustainable growth. It's all a matter of holistic thinking. The region is growing and travel within the region is increasing. Due to the earlier urban sprawl we have become more car-dependent and exploit the countryside more. With new construction along the main corridors we can instead live and travel more sustainably, and at the same time preserve the natural world all around. From an environmental perspective, a structure like this is an essential requirement for the transformation into a sustainable society. The result of focusing on the main corridors will become clear in the long term; a more sustainable regional structure.

LOCATION | KUNGSBACKA, KUNGÄLV AND ALINGSÅS

GROWING SMALL-TOWN CHARM

Several towns in the Gothenburg region are using the region's growth to strengthen urban qualities and link up parts of town. Recurring themes include mixed towns, sustainable travel and green zones. Development is under way in several of the region's charming small towns. The strategy in Alingsås is to become a cohesive cycle-friendly mixed town. Kungälv has high environmental ambitions for its new district Kongahälla, linking central Kungälv with a planned travel centre and the western parts of town.

One of the fastest-growing municipalities in the region is Kungsbacka. The town of Kungsbacka has a detailed comprehensive plan, aiming to increase its population from 18,000 to 25,000 by 2020. Investing within the actual town will ensure more of the coastline can be spared. There are many challenges with regard to growth and sustainability, and lessons from earlier developments need to be combined with new ideas. Kungsbacka is active in the *Uthållig kommun* (Sustainable Municipalities) network with the project *Bilsnål planering* (Planning for reduced car use) in a vibrant small town. The hope is to find innovative ways to improve accessibility in the town. One current construction project is *Väster om ån*, aiming to link the town centre with the Kungsmässan commercial district in a sustainable way.

www.kungsbacka.se www.kungalv.se/In-English
www.alingsas.se

Major initiatives await in both Åsa and Lödöse when they get their own train stations. With convenient and rapid public transport to the rest of the region, villages and towns become both attractive and sustainable.

LOCATION | LÖDÖSE AND ÅSA

RENAISSANCE OF STATION COMMUNITIES

In the 19th century, railways were constructed across Sweden, and whole communities would develop around a new station. Today this trend stands out as environmentally optimal. With efficient public transport in place before homes, shops and workplaces are built, good travel habits can be encouraged from the start. Several new stations are currently being planned in the Gothenburg region, from Lödöse in the north to Åsa in the south. Fast rail connections open up new possibilities, and since the stations are being built on the edge of urban areas new space is created for community development.

Lödöse, mediaeval predecessor of Gothenburg, is geared up for rapid growth. With the new double-track Norway-Vänern Line, Lilla Edet municipality will gain a stop at Lödöse Södra. For Lödöse residents, travel time by public transport to Gothenburg will be halved, to 22 minutes. Lilla Edet's position in the region will be improved, and the ambition of the municipality is to invest in Lödöse, with 600 new homes by 2030. The municipality's new comprehensive plan picks out the area between the station and presentday Lödöse for new homes and services.

Åsa, known to many as the resort with attractive beaches, will once again have a train station. The new station will be further from the sea, but the mental distance will be reduced by having an attractive zone linking the station with the town centre and the beach. The new train station will be completed by 2013 and will offer a 10-minute journey to Kungsbacka and 30 minutes to Gothenburg. In a detailed comprehensive plan for Åsa, Kungsbacka municipality points out how businesses and 25-30 new homes per year will bring the community and the station together by 2030.

www.lillaedet.se
www.kungsbacka.se

LOCATION | THREE DIMENSIONS

SUSTAINABILITY - ALL FACTORS TOGETHER

One thing at a time is usually the best recipe, but when it comes to creating something truly sustainable it's more appropriate to deal with all factors together. Sustainability generally refers to the fulfilment of three dimensions: social, environmental and financial. This approach, for example, permeates the Gothenburg region's objectives and strategies for *Sustainable Growth*. A vast range of aspects and experiences need to be incorporated and interact in order for a community to be sustainable in practice based on the three dimensions. The Gothenburg region boasts several good examples of this. One is *Mistra Urban Futures*, which is a research centre with the whole world as its arena. Another much more local example is *Pilot Gråbo*, with Lerum municipality aiming to ensure that the community of Gråbo develops sustainably in regard to all dimensions.

The investment in new schools is an important part of efforts to make Gråbo Sweden's first sustainable town.

LOCATION | LERUM - LEADING ECO-MUNICIPALITY

PILOT GRÅBO FIRST OFF THE MARK

Lerum is sticking its neck out with its vision of becoming Sweden's leading eco-municipality by 2025. This vision is popular; it receives top marks in Lerum's residents survey. Despite the vision having been adopted in late 2009, environmental work was already gathering momentum, including Lerum becoming one of the first municipalities in the country to gain an environmental diploma for the whole of its municipal administration. However, the vision covers more than just environmental factors; it aims to be characterised by sustainability, creativity and influence.

One crucial piece of the vision work is Gråbo. The *Pilot Gråbo* project is aiming to create Sweden's first sustainable town. Transformation of the centre is planned, with new meeting places, such as an activity park with a sports hall, and a greenhouse in the square. These initiatives are taking place against a background of the community having had social problems and being considered unsafe. Now homes with various forms of tenure are being built around the square. Gråbo will also gain a new central public transport hub, with the centre also being the location for all commercial activity.

One special concern in Pilot Gråbo is the focus on schools. Three newly-built schools were completed by summer 2012. Sustainability is key for both activities and environment. New teaching methods have been tried out, and the school buildings incorporate sustainable thinking, from school environment to choice of building materials and technical systems.

www.lerum.se/en/Startpage/Vision-2025

Mistra Urban Futures has its headquarters in Gothenburg, but has five international platforms. In addition to Gothenburg, there are centres in Cape Town, Manchester, Kisumu and Shanghai.

LOCATION | MISTRA URBAN FUTURES

URBAN KNOWLEDGE IN INTERACTION BETWEEN RESEARCHERS AND PRACTITIONERS

An ever increasing proportion of the Earth's population live in urban areas. This is expected to reach its peak in 2080, with a global population of nine billion, and two thirds of them living in urban areas, compared with half today. The trend can also be seen in Sweden, with growing metropolitan areas, although the challenges here are small from a global perspective.

Mistra Urban Futures is a newly-established centre for sustainable urban development in Gothenburg, with the aim of becoming a world leader in the space of a few years. The unique thing about the centre is its function as an arena, where both researchers and practitioners come together to create knowledge that makes a real difference to the cities of the world. It's a long-term major initiative financed by *Mistra* and *Sida* and seven consortium members, including GR. The centre also has platforms in four other cities around the world.

In specific terms the centre conducts a number of projects in cooperation with researchers, the business sector, municipalities, and others. In the Gothenburg region, for example, interesting knowledge has been obtained about how we can deal with future rises in sea level, how enterprise can be a driving force in sustainable development and what the secret is behind successful decision processes for sustainable urban and regional development. Many of the projects are aiming to increase involvement and learning among citizens, with web-based tools and games, among other things. Mistra Urban Futures is working to create fair, green and dense cities. How can all residents make the most of city living, provide for themselves and live in safe environments? How can we reconcile high quality of life, consumption and the climate challenge? How can cities be compact and efficient with resources, yet at the same time have plenty of green spaces?

www.mistraurbanfutures.se/english

The passive houses in Lindås were the first in Sweden and were designed by Alingsås resident Hans Eek.

LOCATION

ENERGY-EFFICIENT CONSTRUCTION

THE STORY OF PASSIVE ALINGSÅS

ALINGSÅS is known locally for its potatoes and cafés, and also for energy-efficient construction. And deservedly so. With the *Passivhuscentrum* and a whole string of energy-saving new-build and renovation projects, Alingsås is showing the way in sustainable building.

What's the secret behind this success? One common response is real enthusiasts. Architect and Alingsås resident Hans Eek is a name that often comes up; he was an early pioneer in designing passive houses, i.e. well-insulated houses that are largely heated by the energy from people and household appliances. Since its launch in 2007, the Passivhuscentrum has played an important role in collecting and spreading knowledge about passive house technology through exhibitions and advice. The centre is also a platform for the passive house market.

Municipal housing company *Alingsåshem* is responsible for several good examples of such construction. Another real enthusiast can be found there, in the person of Ing-Marie Odegren, MD of Alingsåshem. She believes that the success lies in viewing the work as a social construction project, with energy saving as just one aspect. If you think long term and include all aspects, for example, that the elderly should be able to remain in the area, it is also financially sustainable.

Alingsås municipality is constantly taking things further. In the district of Stadsskogen, 33 new apartments and a pre-school have been built using passive house techniques. In the same area municipal company *Fabs* is implementing the spearhead project *Träffpunkt Stadsskogen* - a meeting place featuring a market square, a school and an activity hall. The goal here is zero-energy buildings, i.e. buildings that do not consume more energy than they produce. This will be achieved through passive house technology and solar energy installations on the roof.

www.passivhuscentrum.se
www.alingsas.se

Brogården in Alingsås has been renovated using passive house techniques.

LOCATION

ENERGY-EFFICIENT RENOVATIONS

ENERGY-SAVING RENOVATION PAYS OFF

THERE ARE MANY EXAMPLES of new energy-efficient buildings. However, the biggest challenge is renovating existing buildings to make them truly energy-saving. Roughly 60 per cent of the country's apartment buildings need renovating within the next ten years, and this will enable major energy savings to be made. One common claim is that high environmental aims in renovation projects are unprofitable or that residents will be unable to afford to stay. Alingsås has demonstrated the opposite.

The Brogården residential area, comprising 300 apartments, has been implementing renovations using passive house techniques. The buildings are being thoroughly heat-insulated, and heat exchangers ensure that heat from the room air is utilised in the ventilation. Energy is also saved through individual metering of electricity and water use, which has reduced residents' consumption. As a result of the conversion of Brogården, the total energy consumption has more than halved, from 216 to 92 kWh per square metre and year.

The renovation is also being implemented with great social consideration, which pays off financially in the long term. The homes will certainly be of an improved standard and thus have higher rents, but with two levels of renovation on offer there is a cheaper option. To date, 60 per cent of the residents have stayed on following the renovation. Brogården has become something of a trademark for owner *Alingsåshem*. The aim from the beginning was to do well by the residents, but the area now also attracts lots of visitors, largely due to the *Passivhuscentrum*.

And now even bigger plans are being hatched. Alingsåshem is planning to renovate the Noltorp residential district, with 700 apartments. This will also be done employing long-term thinking, consideration for residents and passive house techniques as guiding principles.

Climate change increases the risk of extreme weather situations. The images show temporary protection against high water levels in Kungsbacka and flooding in Fiskhamnen in Gothenburg.

LOCATION

CLIMATE ADAPTATION

EXTREME WEATHER WITH THE GREENHOUSE EFFECT

Extreme weather situations are just as traumatic every time. Unfortunately they look like becoming increasingly frequent and more intensive with the climate changes caused by greenhouse gas emissions. Forecasts for Västra Götaland show temperature and precipitation increasing up to 2100. The amount of heavy rain has already increased and high water flows will probably become more common in autumn and winter. Along the coast the water level is expected to rise by up to 80 cm.

In many of the municipalities in the Gothenburg region active work is under way to adapt to a changing climate. Floods in Mölndal and Partille, for example, have shown how significant the damage can be. Kungsbacka has also been affected, but this is now being remedied with an improved distribution system, securing of pumping stations, check valves in the surface water network, alarm systems and temporary protection.

A rising sea level is a serious threat in Gothenburg, since the sea has a big influence on the water level of the Göta River. The City of Gothenburg has carried out investigations, under the title *Extremt väder (Extreme weather)*, which show that large areas could suffer flooding. One result of this work is that the minimum floor level for new construction has been raised and that functions essential to society must be protected by even greater margins. New developments are being planned next to the river, and need to be protected. These measures are expensive, but also mean that existing areas will gain protection when the river rises.

In the long term, heat waves may also become a threat, with summer temperatures similar to those in southern Europe. The temperature in an urban landscape is also several degrees higher than in the surrounding countryside. One way to moderate the effects is more trees and green spaces to cool the city.

www.kungsbacka.se
www.lansstyrelsen.se/vastragotaland
www.goteborg.se

More and more municipalities in the Gothenburg region are promoting the trend of energy-saving construction. The images show Förbo's homes in Lerum.

LOCATION

ENVIRONMENTALLY-ADAPTED CONSTRUCTION

MUNICIPALITIES AHEAD OF THE GAME WITH ECO-FRIENDLY HOMES

Buildings account for roughly one third of society's energy use. New construction offers excellent scope for environmentally-sound and energy-efficient building, and there are many individual examples of this in the Gothenburg region.

In recent years many municipalities have taken further steps, with general guidelines for all new homes built on municipal land. Most of the region's 13 municipalities currently apply levels of energy efficiency that go further than the requirements in building standards. Alingsås, Gothenburg and Kungälv municipalities have also developed a programme that takes an even broader approach. The idea is to incorporate numerous environmental aspects.

The *Environmental Programme for homes in Kungälv municipality* contains guidelines for energy, green spaces and surface water, waste management, material choice, health and indoor climate, vapour barriers and noise. By taking into account as many aspects as possible, undesirable effects can be avoided, for example, high energy efficiency at the expense of good indoor air. Kungälv municipality also has guidelines for how construction is to proceed, and to ensure the correct information is provided when the property is taken over by the manager and when moving in takes place. Kungälv's environmental programme forms part of the agreement signed when the municipality transfers land for development. For private land, the guidelines serve as a recommendation.

Nevertheless, existing buildings account for by far the greatest energy consumption. The municipalities also have an important role to play here, by setting a good example. Almost all municipalities in the region now have energy-efficiency strategies with targets for reduced consumption in their own organisation's properties and use of transport.

www.kungalv.se/In-English

LOCATION

KROKSLÄTT, KONGAHÄLLA AND KVILLEBÄCKEN

THREE SHOWCASES FOR SUSTAINABLE CITIES

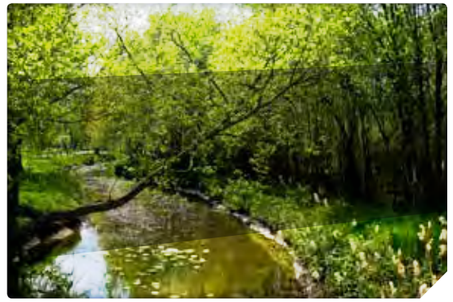
The delegation for Sustainable Cities was set up by the Swedish government in 2008 to provide support for projects promoting sustainable urban development. Several of the projects that received support are in the Gothenburg region, including the Kroksläatt, Kongahälla and Kvillebäcken projects, which go under the name *3K*. The projects will be three important showcases for Mölndal, Kungälv and Gothenburg, showing how sustainable cities can be created in practice. Overall, the projects will try out many new solutions and technologies and thus contribute to knowledge development and export of sustainable solutions.

www.hallbarastader.gov.se

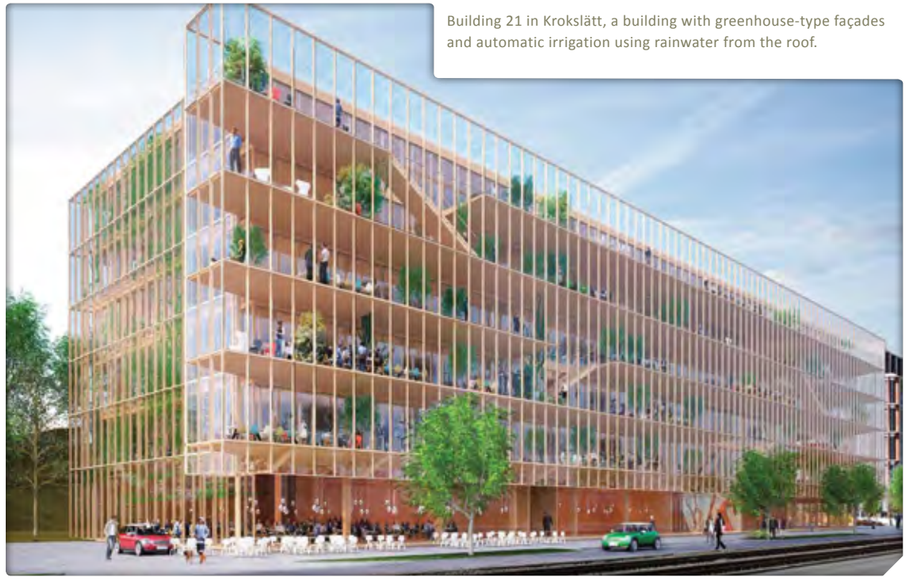
KVILLEBÄCKEN

Kvillebäcken district could become a landmark in many ways. Kvillebäcken is growing based on the current local structure of Hisingen as the first piece of *RiverCity*, tying together Gothenburg across the river. A new market hall links together the old and new. This district is the first to implement the city's programme of environmentally-adapted construction, and all buildings are environmentally-certified. Municipal company *Älvstranden Utveckling AB* and seven other companies are managing the project together.

Examples of innovative elements include bicycle lockers, energy storage in buildings to even out the district heating requirement and vacuum systems that handle waste and recyclable materials. In this setting, where environmental technology is applied in a living urban environment, an innovation platform is under development with *Business Region Göteborg* to promote commercially-driven environmental development and knowledge dissemination. Construction is now in full swing and areas to be built on last are being used in the meantime for urban farming by private individuals and restaurants.



The environmental aims in Kvillebäcken are high for the 2,000 apartments, offices, day nurseries, etc. to be built.



Building 21 in Kroksläatt, a building with greenhouse-type façades and automatic irrigation using rainwater from the roof.

KROKSLÄTT

In nya kroksläatt in mölndal a listed factory site is to be developed into an ecologically and socially-sustainable district offering housing, offices and services. Energy use will be minimised using various innovative solutions. Surplus heat from offices and businesses will heat the homes, in combination with geothermal energy. A shelter cut into the rock will be used to store heat and cooling that can be used at other times of day. Buildings will have a double building envelope with an "entrance hall round the building" that serves as a meeting place. The area will have local wind turbines and façade-integrated solar cells. Green and blue areas will be created to deal with rainwater, for example, small storage reservoirs and terrace planting. A roof garden will be created, and collected rainwater can be used for green plots in the area.

KONGAHÄLLA

Kongahälla is being planned as a new city district and an extension of central Kungälv, with 900 homes, commercial units, services, pedestrian zones, squares and parks. Kungälv municipality, together with four developers, has set objectives for energy, outdoor environment, core values, etc. The aim is to produce more electricity than is used in the district and to have one of Sweden's biggest solar cell installations on a commercial building. New ways of saving energy that are to be tried are district-heating-powered domestic appliances and heat recovery from shower water.

Kongahälla will also have the function of linking the city centre with other districts and connecting to a public transport interchange. The idea is that pedestrian zones and short distances make it easy to access services, culture, recreation and public transport.

ACCESS

IS THE JOURNEY THE GOAL?

Certainly the journey in itself can offer some charm, but we primarily travel to get somewhere. Work, school, grocery shopping or visiting friends. Most passenger journeys in the Gothenburg region are made by car. The region is also a hub for goods transport, with the biggest port in Scandinavia. Alternatives to cars and trucks are now needed in order to reduce climate emissions, give us more space and better health.

Sustainable travel in the region will require major initiatives and new travel habits. All 13 municipalities in the Gothenburg region have agreed on doubling public transport, through the K2020 collaboration. And now ideas are being put into action. The *West Swedish Agreement* involves major initiatives for public transport and cycling. The objective for you personally is perhaps to get out from behind the wheel and instead improve your fitness or enjoy a good book on your journey!

K 2020

One of the Gothenburg region's objectives is for at least 40 per cent of journeys to be made by public transport by 2025, which would represent a doubling of travel by public transport. The K2020 joint project has a strategy for how to make public transport fast, simple, reliable, secure and safe. The West Swedish Agreement is implementing important initiatives that are the first step towards achieving the K2020 objectives.

www.k2020.se

THE AIR QUALITY PROGRAMME

The Air Quality Programme in the Gothenburg region is a collaboration between the region's municipalities and a range of companies to jointly chart the air quality and work towards improving it. This involves, for example, taking air measurements round the clock and producing maps showing the air quality in the region's population centres.

www.grkom.se/luft/english

CLEAN SHIPPING

Shipping is an energy-efficient means of transporting goods, but current emission levels are high, yet could be reduced using known technology. The Gothenburg Region has been involved in setting up the Clean Shipping project, and a number of Sweden's biggest cargo owners are on board. The aim is for those who want to transport their goods to set tough environmental requirements for the carriers. Therefore the project has created the Clean Shipping Index, showing vessels' environmental impact.

www.cleanshippingproject.se

The West Swedish Agreement will give the Gothenburg region a basis for more sustainable travel.

PACKAGE SOLUTION FOR SUSTAINABLE TRANSPORT

The West Swedish Agreement is the biggest infrastructure initiative in Western Sweden since the 1960s. More people will gain access to fast, reliable and more sustainable transport. Public transport services will be improved, commercial transport will be made more reliable and accessibility enhanced. The aim is to make it possible for many more people to live and work here. It involves a package solution that will create a larger labour market and growth, while reducing the negative impact of transport on the environment.

The measures in the package will be implemented over 15-20 years and will be financed primarily through State support and congestion tax. It involves investments in public transport, a new Göta Älv Bridge, the Marieholm Tunnel under the river and the West Link rail tunnel. The package also includes initiatives for road projects, commuter parking, cyclists and pedestrians.

First up is rapid improvements to public transport, allowing capacity for many more passengers when the congestion tax is introduced on 1 January 2013. The two river connections will be complete by 2020, while the biggest project, the West Link, will be completed around 2027.

Other smaller initiatives are also necessary to enable the conversion to more sustainable travel. Public transport requires longer platforms, bus lanes, more vehicles, more frequent services, cycle and commuter parking and other measures at the hubs. The West Swedish Agreement is the first important step in the realisation of the vision in *K2020*, with the objective for the Gothenburg region being for at least 40 per cent of journeys to be by public transport by 2025, which roughly speaking means doubling the number of journeys made by public transport.

www.vastsvenskapaketet.se

THE WEST LINK

THE WEST LINK is a double-track rail tunnel under Gothenburg with stations at the Central Station, Haga and Korsvägen. At present trains to Gothenburg have to turn round at the Central Station, but the West Link would link commuter trains with through lines. This would provide capacity for considerably more trains and enable many more people to reach their destination without having to change. The West Link is also a prerequisite to enable rail traffic in Western Sweden to be developed in the future.

Traffic noise disturbs many people's sleep at night. Common remedies include noise barriers, new windows or new housing developments with bedrooms overlooking a quiet garden.

ACCESS | NOISE

THE ROUTE TO A RELAXING SOUNDSCAPE

Noise is a widespread environmental problem that affects many people. Living in a noisy traffic environment can lead to sleeping problems, irritation, headaches and even high blood pressure. A relaxing sound environment is essential for achieving a sustainable and people-friendly region.

One example is the municipality of Partille, with a motorway and railway running through the centre. The municipality has developed an action plan for noise-disturbed residential properties (over 60 dBA by the façade) and implemented measures such as façade solutions and screened outdoor areas. A new noise mapping project is now being conducted, showing dwellings with noise levels above 55 dBA, to be followed by an action plan. In the long term, all Partille residents will hopefully be able to get a good night's sleep.

Lerum is just as exposed to road and rail noise. Lerum municipality has realised that the two types of traffic go together and is therefore working with the *Swedish Transport Administration*, which is responsible for the E20 motorway and the trains. A major survey in the municipality shows that those who suffer high noise levels from two sources are disturbed much more by each of these than others. Lerum also has thematic addendums to the comprehensive plan in order to plan housing and implement measures to reduce noise.

The City of Gothenburg has a Noise Policy to ensure all new homes have a good sound environment. For any new construction in Gothenburg where the noise may be intrusive (over 55 dBA), it is required that the homes be planned with scope to ensure all bedrooms are sited towards a quiet side, e.g. overlooking a courtyard. The homes must also be located close to public transport, to avoid new occupants being car-dependent and creating even more noise.

www.partille.se/en
www.lerum.se/english
www.goteborg.se

ACCESS | PARKING

SCOPE FOR BOTH ATTRACTIVENESS AND ACCESSIBILITY

Can a growing metropolitan area offer attractive living environments, low environmental impact yet also be accessible to everyone? One important piece of the puzzle for drawing everything together is the issue of parking. It is at any rate a fundamental concept when tackling the matter in Partille and Gothenburg.

Partille municipality's new guidelines and provision for parking apply to both cars and bicycles and are used when assessing parking space requirements. The guidelines have three objectives. The first is good accessibility when all means of travel are weighed together. The second objective is attractive living environments. The third objective is to reduce the negative effects from cars through changed travel. The new parking provision means, for example, that new homes close to public transport, food shops, schools and pre-schools have fewer parking spaces. Homes in central Partille have a maximum parking provision, since access to public transport and services is so good.

The City of Gothenburg's parking policy aims for the city centre to retain the same number of car spaces, but for space-demanding surface parking to be reduced. This will allow squares, streets and quays to be converted into attractive thoroughfares and meeting places. The policy aims to contribute to more people choosing public transport and cycling rather than the car. The effects differ here by how you regulate parking for residents, visitors and workplaces. The parking provision aims to ensure that residents can have access to 24-hour spaces so as not to be forced to use their car unnecessarily. The number of car parks at workplaces, on the other hand, will be reduced substantially if they are easy to reach by public transport.

www.partille.se/en
www.goteborg.se

ELECTRIC BUSES

PART OF THE JOURNEY TOWARDS A HEALTHY URBAN ENVIRONMENT

Good public transport is needed to achieve efficient and environmentally-sound travel in the Gothenburg region. However, public transport also affects the environment. Choice of vehicle and fuel, for example, makes a big difference to climate impact, air quality and noise level. In an urban environment electric power is perfect in many ways, as it yields quiet and emission-free operation, and at the same time electric motors are considerably more efficient than diesel and petrol engines. These benefits become increasingly important as places become more densely populated. Several pilot projects are currently under way in the region for buses, with new technology being tried out, including electrically-powered feeder buses in Nödinge and chargeable hybrid buses in central Gothenburg.

WIRELESS CHARGING AT ÄLVÄNGEN STATION

Ale municipality will be the first in Sweden to have battery-powered buses in regular service. The electric buses will serve as feeder buses for the commuter train in Älvängen, and will allow Älvängen residents to be spared the noise and fumes of traditional buses. This type of bus is in many ways perfect for feeder services in smaller places.

It's a minibus that operates a 15-minute circular route through the community and then charges wirelessly while standing at the commuter station. This is possible using so-called inductive charging, which requires the bus to park over a special charging plate at the station. If this trial goes well, Ale municipality will buy more electric buses.

www.ale.se

HYPER-FAST CHARGING PROVIDES QUIET TRAVEL THROUGH THE CITY

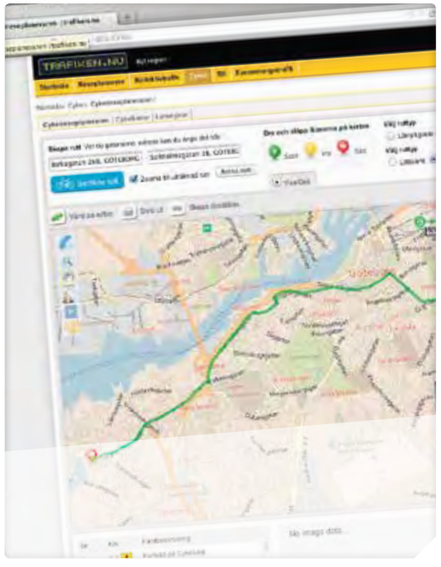
The Hyper Bus project is using Gothenburg as a test arena for so-called plug-in hybrids, i.e. buses that can be charged in just a few minutes at the terminus. The hybrid technology involves a combination of electric and diesel operation, which yields low emissions, less noise and low energy consumption. The technology reduces emissions of greenhouse gases by as much as 75 per cent compared with ordinary diesel buses. The electricity for the buses comes from local wind power installations.

During 2013 three plug-in hybrid buses will be put into operation in scheduled services running through central Gothenburg. The buses will cover the majority of their route on electric power. Hyper Bus is one of many demo and development projects being managed by *Business Region Göteborg*. A whole chain of parties is involved in the project behind the scenes, from technology developers to transport operators, jointly trying out the concept in a genuine urban environment.

www.hyperbus.se/english

ENVIRONMENTAL BENEFITS OF GETTING ON YOUR BIKE

THE CULTURE OF CYCLING IS GROWING steadily stronger. The incentive for getting on your bike can be anything from exercise, and saving time and money, to saving the environment. Cycling causes minimal environmental impact, as bicycles are quiet, emission-free and fossil-free, and require very little space. The potential of bicycles is increasing thanks to improvements to cycle tracks and information and a wider range of cycling solutions. Electric bikes make journeys that were previously too long or strenuous possible. Hire bikes and better parking facilities close to public transport mean that bicycles can form part of a longer journey that flows smoothly with no waiting times. Car-free cycle trails make the bicycle both a holiday option and a long-distance commuter option. The bicycle is definitely a key player in achieving a region with sustainable and relaxing urban environments.



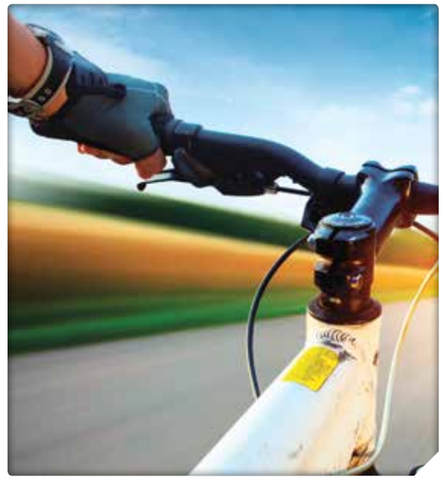
CYKELRESEPLANERAREN - A BOUNDARY-FREE GUIDE

MORE AND MORE MUNICIPALITIES in the Gothenburg region are connecting up to *Cykelreseplaneraren (Cycle route planner)*. It provides flexible assistance in finding the best cycle route. On the website you type in or mark your start and end points and quickly receive a route description in map and text form. In addition, you are told the length of the route, the time it will take, the proportion of cycle tracks along the route and how many calories you will burn. The service does not take into account municipal boundaries. Your route can begin and end in Gothenburg, Mölndal, Partille, Kungälv, Kungsbacka or Varberg.

STYR & STÄLL – CYCLES FOR EVERYONE IN GOTHENBURG

IN CENTRAL GOTHENBURG there's no need to own your own bicycle any more. *Styr & Ställ* allows you to borrow bikes for a small fee from over 50 bike stations. Perfect for tourists or leisurely weekend outings. Another beneficiary is public transport commuters who want to get quickly to and from their stop. You can open a Styr & Ställ account with a public transport travel card. For more and more people, hire bikes have become the link that ties their whole journey together. The flexibility offered by Styr & Ställ is huge, with stations no more than 300 metres apart, where you can drop off and pick up bikes. You will also find information about other stations: where they are located and how many empty slots and available bikes they have.

http://en.goteborgbikes.se



RAIL INFRASTRUCTURE PROVIDES GÖTA ÄLV CYCLE PATH

Cycling is not just appealing in urban areas. Long cycle routes can be extremely appealing to tourists, local residents and serious cyclists. Disused railway lines have often been turned into excellent cycle tracks, for example, *Västgötabanan* and *Säröbanan* have long been cycle routes from Gothenburg through to Sjövik and Särö Västerskog.

Another example can now be found in Ale municipality. Alterations to the E45 and the *Norway-Vänerbanan* north of Gothenburg have also resulted in a new cycle route being created along the Göta River in Ale municipality during the summer months. A newly-constructed service road along the rail line can be used for cycling, walking or horse-riding along the shoreline area from Bohus in the south to Älvängen in the north. The new commuter stations will provide natural points for easier access to the riverside area; all stations will therefore have a link to the service road.

www.ale.se

THE GOTHENBURG REGION'S LIVELIHOOD AND ACHILLES' HEEL

Goods transport is a significant feature of the Gothenburg region, with the biggest port in the Nordic region and large-scale industries making it a growing logistics hub. The increase in goods transport is also a major challenge from an environmental perspective. Total greenhouse gas emissions have increased in the region due to heavy road transport. In order to break the trend, more goods need to be transported by rail and sea, and road transport needs to be made more efficient and fossil-free. In densely-populated urban environments it is extremely important to minimise the impact from goods transport, as it affects many people. However, there are already several good examples of different types of environmental adaptation of city distribution, trucks and overland transport to and from the port.

CLIMATE-SMART CITY DISTRIBUTION

Climate-smart city distribution is a demonstration project run by *Business Region Göteborg* in collaboration with the business sector and public players. The aim in the short term is to halve emissions of greenhouse gases from goods transport within the City of Gothenburg low emission zone. Heavy vehicles within the low emission zone in Gothenburg and Mölndal already have to have lower exhaust emissions, but now there will also be a focus on greenhouse gases. The project involves numerous transport companies, vehicle manufacturers, fuel suppliers and public organisations. The transport companies aim to reduce their climate impact by 50 per cent through more efficient city distribution, renewable fuels and energy-efficient vehicles. The project will provide practical experience of new technologies and fuels and how goods transport can be coordinated. And, of course, Gothenburg city centre will gain, in the form of less heavy transport and reduced climate impact.

www.climatesmartcitydistribution.com

BiMe TRUCKS – LIQUID GAS GOES FURTHER

Biogas is a fuel offering numerous benefits. It's renewable, has low harmful emissions and can be produced from sewage sludge, compost and manure. Biogas has not previously been an option for long-distance goods transport, since the range of the vehicles was too short. The *BiMe Trucks* project is laying the foundation for use of biogas for heavy transport too, using a combination of liquid biogas and diesel to reduce climate impact by 70 per cent. The biogas is liquified by cooling, so it then takes up much less space in the tank than it does in an ordinary truck.

BiMe Trucks is being project-managed by *Business Region Göteborg* together with gas suppliers and vehicle manufacturers, and the aim is to introduce 100 methane-diesel trucks and Sweden's first four filling stations. Gothenburg already has one filling station.

www.bimetrucks.com

RAIL SHUTTLES

Rail services to and from the Port of Gothenburg run like clockwork. Roughly 50 per cent of all containers from the port now go by train to cities throughout Sweden and Norway. At the start of the 2000s that figure was only around 20 per cent. The explanation is Railport Scandinavia, a system of rail shuttles for containers to inland terminals in almost 30 cities. For the Gothenburg region, the regular goods trains replace roughly 400 trucks on the roads every day.

www.portofgothenburg.com

THE OUTDOORS

BACK TO NATURE?

Why do people live in the Gothenburg region? Many would probably say proximity to nature and the sea. In a metropolitan area, green spaces and water are invaluable. After work or school we want to be able to enjoy the outdoors. There are other values too in the form of plant and animal life, water and forest resources and other services that nature provides for free as long as we take good care of it.

The region is growing and it is therefore even more important to safeguard and develop green areas. All 13 municipalities in the Gothenburg region have agreed that the coast and large interconnected green areas must be looked after and utilised.

The Coastal Area and the Green Wedges are not concerned with the administrative boundaries. In order to be able to enjoy the outdoors in the future, utilisation of these areas requires a balanced and holistic approach.

THE WATER QUALITY ASSOCIATION OF THE GÖTA RIVER

The Water Quality Association of the Göta River is an association of municipalities and companies and exists to protect and improve water quality within the Göta River drainage basin. Water quality is checked at various points along the river. This is essential for animal and plant life, but also for the 700,000 or so people dependent on the Göta River for drinking water. Water from the river is also used by industry, and the river is used as a transport link for shipping to and from Lake Vänern. The Water Quality Association is managed by GR.

LIMING

Finely-ground limestone is added to many lakes and waterways in the Gothenburg region to prevent water life being wiped out. This has been necessary ever since the 1970s, as the lakes in the region are affected by acid rain, caused by emissions into the air. Thanks to the liming we have, among other things, regained natural stocks of sea-going salmon and salmon trout. GR is responsible for the liming measures, on behalf of the county administrative boards in Västra Götaland and Halland and several municipalities.

GREAT VALUE IN INTERCONNECTED GREEN AREAS

The Gothenburg region has something that many metropolitan areas in Europe can only dream of: its green wedges, large interconnected areas of forest and agricultural landscape, that extend deep into the metropolitan area. These are often lake-dotted, forest-clad rambling countryside that offers a great feeling of freedom. These wedges have value for recreation, plant and animal life, cultural history, forestry and agriculture and as local climate and environment improvers. Some of the true gems are nature reserves, looked after by the *Västkuststiftelsen* (West Coast Trust) on behalf of the county administrative board. In recent years municipal nature reserves have also become more common. The majority of the large green wedges are not reserves, but are extremely valuable to the region's 13 municipalities. GR is focusing on finding a balance between developing and preserving this blue and green structure.

GROWING MUNICIPALITIES WITH GREEN AMBITIONS

Mölndal and Härryda are two municipalities that are growing rapidly and have realised the value of the green wedges that pass through each of them. A green wedge, including the nature areas of Sandsjöbacka and Änggårdsbergen, extends through Mölndal. These areas are bisected by one of the major routes into the city centre and by increasing numbers of new developments. Mölndal's comprehensive urban planning includes proposals for creating a green corridor so that animals and people can easily pass through the valley via a so-called eco-duct over the highway traffic. The aim is to create a corridor where various animals thrive and can move freely between the nature areas and to provide space for a hiking trail.

Härryda has two green wedges running through the municipality. These are designated and described in the municipality's new *comprehensive plan* and *nature conservation plan*. All nature areas have been classified into different levels of consideration in order to avoid exploitation where the highest natural values are found. Härryda municipality also has a *Green Plan,* which looks more closely at the character of the various localities and how the green spaces closest to the larger built-up areas fit together with developments and water. One objective of the green plan is to specifically adapt green areas to the identities of the localities, such as old mill towns or winter-sports resorts.

www.molndal.se/english
www.harryda.se/english

The Gothenburg region is growing. With good knowledge within planning, natural values can be protected or compensated for when new areas are built.

THE STORY OF THE GREEN PLANS

Knowledge is perhaps the single most important factor to enable a growing metropolitan area to be combined with rich natural values. Without knowledge, idyllic spots or refuges for endangered species may inadvertently be lost. This insight became the starting point for the City of Gothenburg's efforts to increase knowledge of natural and recreational values when undertaking new construction projects.

It began with the project *Nature, Culture and Sociotopes*, knowledge documentation linked to maps. It comprises an inventory of animal and plant life, cultural relics and so-called sociotope maps. A sociotope map shows how public spaces and green areas are used for activities such as bathing, exercise or picnics. The maps are based on observations and surveys in the city districts, and locations are classified differently depending on whether they are used by local residents or the whole city. This work will now continue with a *Green Plan* that will primarily be based on people's access to different types of green spaces in the city. This may be access to a nearby park or a location full of plant and animal life.

The City of Gothenburg also has a *Programme of compensation measures for nature and recreation*, which is employed when planning new areas. The ideal scenario is for no valuable areas to be lost when undertaking new construction, but if this is not possible, the aim is to minimise the damage or at least compensate for the lost values. This may involve replacing a playground or a frog pond.

The latest step is the project *Ecological landscape analysis*. This aims to gain improved knowledge of endangered species by looking at the entire landscape. The idea is to create a tool that shows environments where a certain species lives, the species' biotope. By matching the species you want to protect with the habitats in which they thrive, you can ensure the existence of adequate areas for long-term conservation.

www.goteborg.se

THE OUTDOORS | THE COASTAL AREA

MORE ATTRACTIVE IF THE COAST IS CLEAR

What would the Gothenburg region be without the sea and coastline? For many it represents childhood summers or a dream location to live. This also means that the pressure to develop is even greater along the coast. In GR's structural illustration the 13 municipalities have agreed that the qualities of the coastal zone must be safeguarded and developed and that extra care is required in shoreline areas. Accessibility and attractiveness are threatened if current unique natural and cultural features are not protected. The coastal zone is also bound up with animal and plant life in the sea. Today there are many worrying signs of ecological imbalance in the sea, with eutrophication, overfishing and climate changes. Several of the region's municipalities are therefore working together on the *8 fjords* project to protect sea life.

THE OUTDOORS | 8 FJORDS AND THE STIGFJORDEN PROJECT

UNIQUE LIFE AROUND TJÖRN AND ORUST

The coast is something of a larder and a nursery for the sea. One example is the spawning grounds for fish in the fjords around Tjörn and Orust. The EU *8 fjords* project is currently being conducted in this area to gain more knowledge and establish measures for the environment, outdoor life and sea-based livelihoods. The municipalities of Tjörn, Stenungsund, Kungälv, Uddevalla and Orust are managing the project along with other organisations. The aim is to take an overall approach to everything from wetlands to sustainable tourism. One measure implemented is tighter fishing regulations to protect local stocks of cod, once thought to be gone but now re-discovered. Another is to reduce emissions from small boats through harbours beginning to deal with toxic marine paint and latrine waste.

In parallel with *8 fjords*, Tjörn and Orust municipalities are also conducting a pilot project to reduce eutrophication in the vulnerable Stigfjorden. The fjord is eutrophic due to emissions and poor water exchange. The *Stigfjorden project* is charting, providing information and conducting inspections to reduce emissions from the islands' individual sewer lines and agricultural activities. And it's well worth it. The environment around Stigfjorden has great value for nature, culture and recreation. This has resulted in the whole area being viewed as strategic and being designated for conservation in Tjörn's comprehensive planning.

www.stenungsund.se/english
www.tjorn.se/english

THE OUTDOORS | THE GÖTA ÄLV RIVER

A SHARED WATERWAY

It's no coincidence that the Gothenburg region is located where it is. The point where the Göta River flows out into the North Sea is a strategic location for trade with the rest of the world and with the river as a channel to Lake Vänern. The Göta River contains more water than any other river in Sweden, with a width that is difficult to span in places. The 13 municipalities of the Gothenburg region have agreed to limit the barrier effects and to prevent the risks presented by climate changes. It is easy to forget how many parties need the water. The river boasts an unusually large number of fish species, and the water is used by industry and for power production. And, of course, the Göta River is the source of drinking water for almost 700,000 people. In order to safeguard the water, a water protection area is now being created along the entire river and measures are being implemented to prevent any spread of contagion.

THE OUTDOORS | THE VISK PROJECT

ANTIVIRUS MEASURES FOR 700,000 WATER-DRINKERS

Fresh drinking water is our most important basic requirement, but it's not to be taken for granted. There is a risk, for example, of contagion being spread via our water supply. When outbreaks have occurred in Sweden, viruses are often the probable explanation. The biggest risk of contagion is after heavy rain because sewage can then spill out without proper purification. Viruses can then be carried with the untreated water into the water purification plant. The EU *VISK* project is aiming to reduce vulnerability to water-borne virus contagion, even in a changed climate. VISK stands for "Viruses in water, Scandinavian knowledge bank" and involves research institutions, authorities and municipalities in Scandinavia. GR, the City of Gothenburg, and Kungälv and Lilla Edet municipalities are some of those taking part. The project consists of numerous elements. One thing to be studied is how distribution takes place, e.g. the connection between municipal water and stomach upsets. Even low levels of virus content can spread contagion. Developing special analyses will enable viruses to be detected more easily. The project also involves trials with virus filters at water purification facilities. Communication procedures will also be developed, so all responsible parties can be alerted in the event of a suspected outbreak and warnings can quickly be issued to consumers should an outbreak occur. The project will build up virus expertise and analysis capabilities within the region, and international networks will be created.

LIFESTYLE

THE ONE WITH THE MOST STUFF...?

Increased affluence has meant that we travel more and further afield, that we import more goods and eat different types of food. Globally, Swedes' climate impact has increased. However, it is possible to consume wisely and still enjoy good living. It is perhaps not "the one who has the most stuff at the end who wins".

Environmentally-sound purchasing is also about commerce being localised so that access is possible without a car. Meeting places accessible to everyone and that, together with commerce, provide a vibrant environment also generate great qualities. All 13 municipalities in the Gothenburg region have agreed on a commercial strategy with shared responsibility for ensuring that the regional commercial structure is sustainable in the long term.

COMMERCIAL STRATEGY

The commercial strategy for the Gothenburg region is an agreement to take joint responsibility for the retail field. People are living, working and doing business in an increasingly dispersed pattern, which means purchasing and travel patterns will have regional consequences. Wise planning will yield conditions for long-term sustainable commerce. This means that we need to prioritise commerce in urban areas so that it is accessible by public transport, on foot and by bike. The trend of commerce being dispersed to industrial districts and shopping malls away from city centres and residential areas also needs to be broken.

Food choices affect the environment. The proportion of organic food is increasing rapidly in several of the region's municipalities.

LIFESTYLE | THE ENVIRONMENTAL IMPACT OF FOOD

MORE AND MORE ECO-FRIENDLY MEALS BEING SERVED IN THE REGION

THE ENVIRONMENTAL IMPACT OF FOOD is becoming more of a focus. The type of food we eat plays a major role, along with where and how it is produced and transported. Just over 25 per cent of Swedes' climate impact is linked with food, and most emissions come from meat production. Municipalities in the Gothenburg region are doing a lot to help the environment, e.g. purchasing more organic food for schools, reducing wastage, encouraging people to grow their own and offering vegetarian food.

Lerum municipality serves the most organic meals in the region, and in 2011 it was fourth best in the country, with a proportion of almost 35 per cent. The increase means that children and others in Lerum are eating more and more eco-labelled food, i.e. food produced without the use of chemical pesticides, artificial fertiliser or genetically-modified organisms. This labelling also often involves requirements relating to animal welfare and greenhouse gas emissions. The goal for the City of Gothenburg is to be serving over 50 per cent organic food by 2014. One of the focus points is to be first with 100 per cent organic meat in schools and homes for the elderly. The next step could be one green day per week with vegetarian food. One requirement for procurement of meat and cooked meat products, bananas, milk, coffee and tea is that they be organically produced.

At Eklanda School in Mölndal vegetarian food is served once a week. Pupils act as tasters in order to find suitable vegetarian dishes for the menu. The school also has its own kitchen garden where the pupils can grow their own vegetables. In order to ensure eatable food is not thrown away unnecessarily, Mölndal has set a target to reduce wastage. An individual calculation tool has also been developed by the municipality for replacing dishes with a substantial environmental impact.

www.lerum.se/english
www.goteborg.se
www.molndal.se/english

FAIRTRADE CITY

More and more municipalities in the region are becoming Fairtrade Cities. First off the mark was Alingsås, followed by Lerum, Härryda and Gothenburg. A certified Fairtrade City focuses on purchasing fairtrade goods, which ensure better conditions for growers and workers in developing countries. The focus is on social sustainability, but environmental consideration and organic production are also promoted. Härryda municipality is increasing its ethical purchasing, boasts outward-looking activities, and the local business sector offers fairtrade products in shops and at workplaces.

Eleven families in Gothenburg tried their hand at sustainable living for one year. Reducing waste was where they did best.

LIFESTYLE | LIVING LIFE

THE ART OF COMBINING HAPPINESS AND THE ENVIRONMENT

There's no reason why living in an environment-friendly way should be less enjoyable. That was the basis for the City of Gothenburg's project *Living life*, where eleven families were challenged to implement sustainable lifestyles incorporating both quality of life and environmental ambitions. *Living life* differs from other projects by including the concept of quality of life in an environmental project. This is perhaps more important than you might think. Transition to a fossil-free future involves lifestyle changes just as much as new technology. In order to be successful, it is important to show that a sustainable lifestyle does not mean a poorer quality of life.

Living life attracted great attention from the media, which was also the intention. Well-known Gothenburg personalities got involved in the project alongside the families. The families were given seven challenges over the course of a year of trying to live more sustainably in terms of food, travel, energy consumption, chemical use, waste, leisure and celebrating Christmas. To assist them, the families were given both information and coaching from municipal experts. On average, the families reduced their climate emissions by 14 per cent over the year. The most successful element was the reduction in non-recycled waste, with the families managing to reduce waste going into the rubbish bin by a full 40 per cent, which contributed to the waste challenge receiving the environmental prize for its achievement at the annual *Swedish Recycling Awards* in Stockholm.

www.goteborg.se

A surge of enthusiasm for food cultivation is sweeping the cities of the world. Temporary growing plots, pigs and tractors invade the city.

LIFESTYLE | URBAN FARMING

PIGS AND CROPS WHERE YOU LEAST EXPECT

Growing food in urban areas is nothing new. However, traditional allotments have been joined by a new wave of urban farming. Guerilla gardeners have popped up in Gothenburg, and another group have turned the space outside the Museum of World Culture into a green oasis.

Allotments and other gardening plots have long been managed by the City of Gothenburg. The *Stadsnära odling* (Urban growing) initiative is intended to stimulate even more small-scale and local growing. The aim is to create more new growing plots, ideally in unconventional locations. The project is already under way in the neighbourhoods of Biskopsgården, Gamlestaden, Kålltorp, Högsbo, Backa and Angered. It is hoped that *Stadsnära odling* will spread enjoyment and knowledge and generate contact between different groups of people.

It's growing in schools too. With the *Educational cultivation plots* project the City of Gothenburg has launched a growing project to bring together multiple generations. First up is Guldheden School, which is undertaking gardening activities at a nearby meeting place for pensioners, and Flatås School, where children, parents and other adults are growing together.

Private initiative *Stadsjord* (Urban Soil) is also generating many growing projects, collaborating with municipal services, churches and colleges, among others. Stadsjord first appeared in the neighbourhoods of Bergsjön and Högsbo, with allotments and rooting pigs. A more recent location is on vacant demolition sites in Kvillebäcken at Hisingen, where cultivation is taking place while awaiting new construction. More pigs have been brought into other districts like Majorna and Lundby to root and fertilise the soil before new growing plots are established.

www.stadsnaraodling.se
www.goteborg.se

EFFICIENCY

WHY WASTE ENERGY?

If we are to successfully tackle the climate challenge , we need fossil fuels to be rapidly phased out. Alternative fuels are limited and therefore energy must be used efficiently in order to cover our future needs. And everyone has something to gain here in the long term - for who wants to waste energy?

How can the resources we have be enough for everything? It is important to build in the right location, as well as travelling and doing business in an environmentally-sound way. It is equally important for energy production and industry to phase out fossil fuels. Over half of the climate emissions in the Gothenburg region come from refineries, chemical industry and power and heating plants.

Yet it is also companies that can produce the technical solutions. The 13 municipalities in the Gothenburg region are joint owners of *Business Region Göteborg*, which is working to support projects together with the region's companies. Western Sweden is at the forefront, for example, in the fields of biogas, environmental vehicles and wind power.

BUSINESS REGION GÖTEBORG

Business Region Göteborg is working towards sustainable growth and employment in the Gothenburg region. This is being done together with senior industry players and the business sector and R&D players in the 13 municipalities in the Gothenburg region.
Business & Environment is the umbrella term for a work process to initiate, conduct and develop demonstration projects involving cooperation between the business sector, R&D and community players, and to increase international business opportunities. The idea is to combine business thinking and environmental expertise, so that new climate and environmentally-adapted products and services can be developed that also have potential on the global market.

www.businessregiongoteborg.com

ÖCKERÖ INTENDING TO BE SELF-SUFFICIENT

Wind power is advancing in Sweden. Most municipalities in the Gothenburg region have produced wind power plans that designate suitable locations for wind turbines. If all these plans were implemented, this would equate to 15 per cent of the region's electricity requirement. It is very windy along the region's coastline and in upland areas. However, in a densely-populated metropolitan area wind power must also integrate well with other interests, and risks of turbines disturbing the surrounding area must be taken seriously.

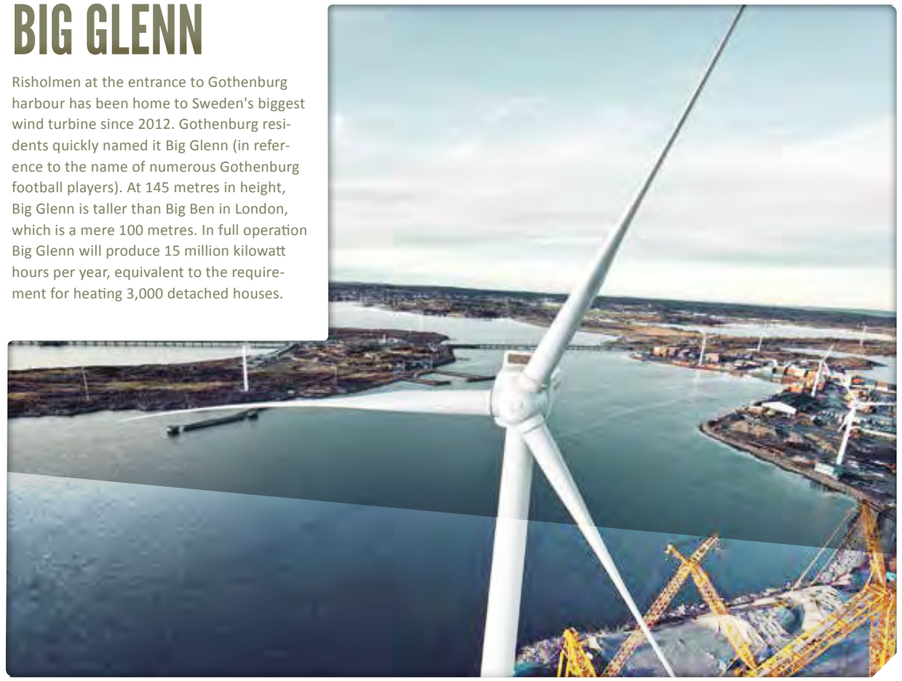
Öckerö municipality has set the bar high with its target of becoming self-sufficient in renewable electricity by 2014. The municipality acquired early knowledge about offshore wind power through the EU *Power Cluster* project. The municipality's wind power plan designated an area out at sea as suitable for wind power. If this wind farm were to be realised, the target of being self-sufficient would be achievable. The area for offshore wind power is shared with Kungälv municipality's designated areas, and collaboration between the municipalities has been initiated.

The municipality is also active in *Power Väst*, a network in Västra Götaland working towards more wind power and increased employment within the industry. The municipality has already purchased a wind power installation that covers a large portion of the electricity requirement for its municipal properties.

www.ockero.se
www.vgregion.se/en

BIG GLENN

Risholmen at the entrance to Gothenburg harbour has been home to Sweden's biggest wind turbine since 2012. Gothenburg residents quickly named it Big Glenn (in reference to the name of numerous Gothenburg football players). At 145 metres in height, Big Glenn is taller than Big Ben in London, which is a mere 100 metres. In full operation Big Glenn will produce 15 million kilowatt hours per year, equivalent to the requirement for heating 3,000 detached houses.



THE ROOFS OF THE CITY - A POTENTIAL SOLAR POWER RESOURCE

Solar power is becoming an increasingly realistic option even at the latitudes of the Gothenburg region. Compared with the Sahara, admittedly only half as much solar energy can be captured. However, the conditions are similar to Germany, where they produce solar cell electricity equivalent to 20 nuclear power stations in full sunshine. Solar cells are also rapidly becoming cheaper and new designs are appearing that blend in with housing developments. It is also starting to be more common for electricity suppliers to allow those who procure solar cells to offset their surplus energy.

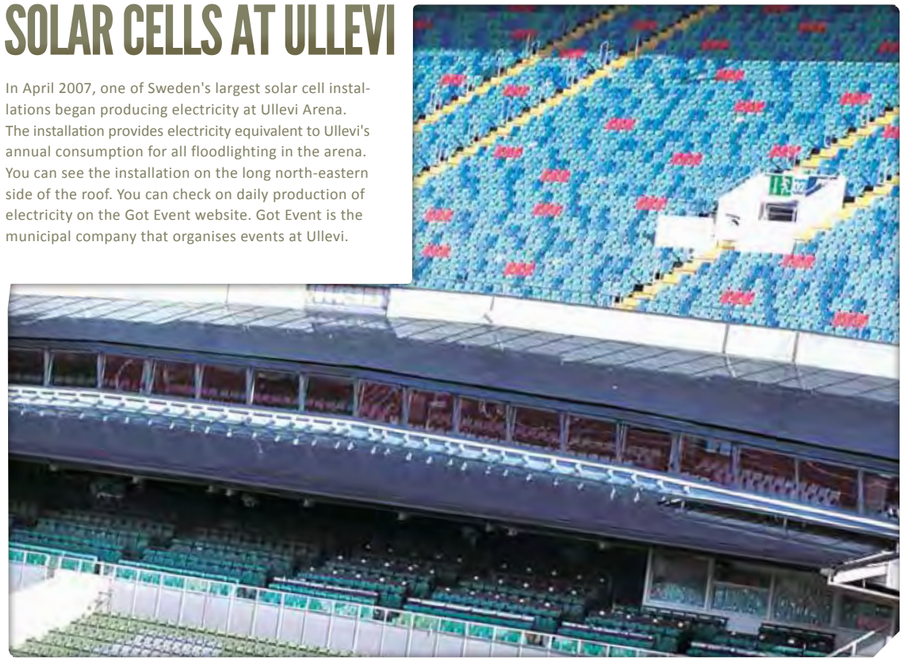
There is now a tool available to determine how suitable a roof is for solar cells. Using *Solkartan* (Solar map) you can obtain data about roof area and insolation in a normal year for properties in central Gothenburg. *Solkartan* uses the calculation tool *SEES*, which has also been used in a case study of Gothenburg, in which the potential for solar cell electricity on today's roofs was calculated. The roof areas that can produce over 950 kWh per square metre annually could supply electricity equivalent to 20 per cent of Gothenburg's electricity requirement.

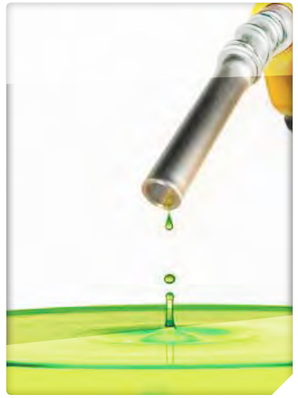
Some of Sweden's largest solar cell installations are in the Gothenburg region. Three blocks of flats in Hjällbo have had 700 square metres of solar cells installed on their roofs and façades since 2011. Ullevi also has a large solar cell installation.

www.goteborgenergi.se/English

SOLAR CELLS AT ULLEVI

In April 2007, one of Sweden's largest solar cell installations began producing electricity at Ullevi Arena. The installation provides electricity equivalent to Ullevi's annual consumption for all floodlighting in the arena. You can see the installation on the long north-eastern side of the roof. You can check on daily production of electricity on the Got Event website. Got Event is the municipal company that organises events at Ullevi.





The raw materials for chemical companies in Stenungsund are to be substituted by 2030, when fossil materials are to be replaced.

EFFICIENCY | SUSTAINABLE CHEMISTRY 2030

CHEMICAL COMPANIES SET THEIR OWN CHALLENGE

Stenungsund is one of the Gothenburg region's major industrial municipalities, with a cluster of five chemical companies. The companies provide thousands of jobs and a wide range of products, but also have a local and global environmental impact. Just over 15 per cent of the region's carbon dioxide emissions come from the chemical companies at Stenungsund, due to the raw materials generally being from a fossil source. This is something that the companies intend to change.

Since 2009 Region Västra Götaland has had an objective of making the West Swedish economy independent of fossil energy by 2030. The chemical companies have decided to fulfil their part of this objective through the vision *Sustainable chemistry 2030*. This vision gives the chemical companies barely 20 years to take a huge step, from their current raw material base, which is 90 per cent fossil, to being renewable. The renewable alternatives could come from forests, agriculture, the sea and waste. Both biogas and bioethanol are relevant alternatives that can be processed into advanced chemical and material products. Environmental benefit can also be increased by recycling material from the bio-products and at a later stage sending them to be used for energy production.

Representatives from academia and the public and private sectors have identified five strength areas in Western Sweden. One of these is *Green chemistry*, for which *Business Region Göteborg* is the host organisation. Realisation of *Sustainable chemistry 2030* would further strengthen Western Sweden's position in the future. Positive synergy effects may also arise with other sectors, academia and community players. One part of the vision is for the chemical companies to also contribute to better utilisation of waste heat by linking up the district heating grids in Western Sweden.

www.businessregiongoteborg.com/chemicalindustry
www.stenungsund.se/english
www.vgregion.se/en

The mill at Lilla Edet no longer burns oil, but instead uses the waste from paper manufacturing and passes surplus heat on to the community.

EFFICIENCY | THE CLIMATE CHALLENGE

THE STORY OF FOSSIL-FREE LILLA EDET

Climate work is one of Lilla Edet municipality's strongest sectors. Few other municipalities have succeeded in the same way in creating initiatives enabling companies and individuals to replace fossil fuels. To enable the national environmental objectives to be achieved, between 1998 and 2011 it was possible for all municipalities to apply for grants via the local investment programme, *LIP*, and the climate investment programme, *Klimp*. Lilla Edet has been one of the best municipalities in the country at devising measures to effectively reduce climate impact, and as a result they have received a lot of support.

Lilla Edet has an energy-intensive paper industry that previously used a lot of oil in its processes. Through one of the climate projects the oil has been replaced by waste products from the paper manufacturing process and wood-chips. The mill now boasts its own electricity production, and district heating in Lilla Edet is based almost entirely on hot water from the mill. Another project resulted in 80 per cent of the oil-fired boilers in homes in the municipality being replaced with renewable fuel and solar energy options.

Biogas has been a recurring theme in Lilla Edet's climate work. The municipality had its own pilot plant for biogas from ley crops at an early point, which then led to it investing in a public filling station for biogas at the start of the 21st century. The bulk of the municipality's car fleet now runs on biogas. As an alternative to the car, they have also invested in cycle tracks and are trying to increase interest in public transport.

www.lillaedet.se

A WEST SWEDISH SPECIALITY

BIOGAS IS AN IMPORTANT FACTOR IN conversion to a fossil-free society. Biogas vehicles, gas filling stations and local biogas production plants appeared early in Western Sweden. Biogas has numerous benefits in addition to not contributing to the greenhouse effect. It can be produced from resources that would otherwise not be used, such as sewage sludge, compost, straw and manure. The gas yields exceptionally low emissions of harmful substances into the air when used to power vehicles.

One explanation for biogas gaining a footing so early in Western Sweden is the many projects run by *Business Region Göteborg*. Through support from the climate investment programme, *Klimp*, for example, there have been investments in everything from new gas filling stations, biogas production and distribution to vehicle development and information campaigns.

The positive trend for biogas is coming along nicely – and is much needed! Many are interested in biogas as a replacement for fossil natural gas for transport, district heating and industries in the region. In order to obtain large enough quantities, increased anaerobic digestion of biological waste and other unutilised resources is required. And also more large-scale biogas production, with the *GoBiGas* project being the first step.

www.businessregiongoteborg.com

GOBIGAS

GOBIGAS is an initiative involving new gasification technology for large-scale biogas production in Gothenburg, with the first step being a demonstration plant that will be ready by 2013. Following evaluation, a decision will be made as to whether a larger plant should be built. The biogas will be produced from forestry waste such as branches, roots and tree tops. The plant is being built by the mouth of the Göta River, as the location is near to gas and district heating grids, and the forestry waste can be transported there by water and rail.

Our food scraps can become both biogas and nutritious compost. Many municipalities in the region are therefore focusing on increasing collection of food waste.

DUAL ENVIRONMENTAL BENEFIT WITH DIGESTED FOOD WASTE

COLLECTION AND ANAEROBIC DIGESTION of food scraps yields dual benefit. It exploits the energy content, as biogas is produced during digestion, and the nutritious compost formed can be used to replace artificial fertilisers and extraction of finite resources such as phosphorus.

The Gothenburg region has a regional waste plan, *A2020*, with a target of at least 50 per cent of food waste being processed so that the nutrients can be utilised, and separate food waste becoming biogas. Almost all municipalities in the region are investing a great deal in collection of food waste. Härryda and Kungsbacka municipalities, for example, are introducing systems for collection in brown bags and containers, along with environmental refuse collection charges.

Härryda municipality expects to be operating food collection for the whole municipality by 2014. Those who sort their food waste will be doing their bit for the environment, but also getting a good deal, as they will avoid an increase in the refuse collection charge of around 60 per cent. The food waste bags collected will be taken to a facility that crushes, mixes and squeezes the waste into a viscous pulp (slurry) for onward transport to a biogas plant.

All households, schools and other public operations in Kungsbacka municipality will be able to send their food waste for biogas production by 2013. It will be collected by modern refuse collection vehicles powered by a mixture of biogas and rapeseed-based biodiesel. The collection vehicles have two compartments, one for food waste and one for unsorted waste, meaning that the increase in numbers of people sorting will not affect transport requirements.

www.harryda.se/english
www.kungsbacka.se

WASTE

DO WE HAVE TO PRODUCE GARBAGE?

THE DOWNSIDE OF OUR consumption is all the waste left over. Better times have always meant more waste, and in the past fifty years, for example, waste per person has more than doubled in the Gothenburg area.

Waste is not something you really want to exhibit, but the environmental impact from packaging, transport, toxins and usable stuff that is thrown away is huge. Waste can be reduced right from the manufacturing and purchasing stage. The best thing for the environment is to avoid waste arising. Scraps that are left over need to enter the ecocycle to be useful again.

The 13 municipalities in the Gothenburg region have agreed on sustainable management through the *A2020* waste plan. For example, the rise in the quantity of waste must be halted and material recycling must increase. At least 50 per cent of the food waste should be collected to become compost and biogas.

A 2020

A regional waste plan, A2020, has been in place since 2010, with agreement between the region's 13 municipalities on what must be done to improve waste management up to 2020. The aim of the plan, among other things, is to ensure waste does not increase, to be more economical with resources and to reduce environmental impact and dispersion of toxins from waste. It is hoped that A2020 will break the trend of increased quantities of waste. The regional collaboration also involves finding shared solutions for other ecocycle issues such as water supply and sewage.

WASTE | REDUCED QUANTITY OF WASTE

PERHAPS THE TOUGHEST WASTE CHALLENGE

Viewed over a longer time perspective, sorting of waste has increased significantly in Sweden. However, the total quantities of waste have not decreased, except during major recessions. Is it a natural law that increased affluence has to lead to increased quantities of waste? Of course not! Consumption doesn't have to consist of lots of heavily-packaged stuff; it can also be services, culture, entertainment or second-hand and quality purchases that last a long time.

The first objective of the Gothenburg region's *A2020* waste plan is for household waste per person not to increase up to 2020. In other words, the aim is to break the link between the economic situation and quantity of waste per person in the region. In order to successfully minimise waste, municipalities, consumers, producers and traders all need to do their share. As consumers, for example, we can say no to advertising, reduce food waste, mend broken items and pass on more second-hand items.

One way to reduce the total quantity of waste is a weight-based charge, something that the City of Gothenburg and other municipalities in the region are introducing. At each collection, the refuse collection vehicle weighs the waste, and the charge is based on how much is thrown away. The charge can also be reduced by opting for fewer collections or smaller containers. This is a a fairer system, as you then pay for what you throw away. It is hoped that recycling will increase and the total quantity of waste will decrease. In recent years the quantities of waste per person in Gothenburg have not increased despite the economic situation having picked up, so it's not completely impossible...

www.goteborg.se

Alingsås and Mölndal use double dustbins with four compartments. Waste sorting is made as simple as possible for home-owners.

WASTE | INCREASED WASTE SORTING

KERBSIDE COLLECTION ON THE WAY

Dealing with your waste can mean dashing round to a number of different places. In the Gothenburg region much is being done to make life simpler for residents. For example, some property owners, both municipal and private, have long had bin rooms where both various packaging and certain hazardous waste can be left for collection. The Gothenburg region's waste plan, *A2020*, has a target for halving the quantity of packaging in combustible household waste by 2020. Many municipalities are currently trying out advanced kerbside collection services. For home-owners, this means trips to the recycling centre are no longer needed, and the ordinary refuse collection vehicles will take away more fractions of waste.

Alingsås municipality is first in the region with kerbside collection services that accept eight waste fractions. At no extra cost on top of a standard subscription, home-owners can switch to two new larger containers with four compartments in each. This will be introduced in stages through to 2014. In addition to an expected substantial increase in recycling, residents will save on space indoors, as well as time and the environment in the form of fewer journeys.

Mölndal is also trying out double four-compartment containers, but with a total of twelve fractions. The containers will also have small boxes for small electronic items, batteries, light bulbs – i.e. hazardous waste that particularly needs to be separated. An initial trial saw recycling increase substantially, and almost all reactions were positive. A larger trial scheme now awaits, covering 1,000 houses, and hopefully the system will become permanent.

The Cities of Mölndal and Gothenburg are two of several municipalities participating in another project, which is testing a variant of kerbside collection with mixed fractions. Home-owners can place all kinds of packaging in a bin that is emptied for sorting at another location. An analysis will determine how much this increases the willingness to sort waste.

www.alingsas.se
www.molndal.se/english

At the Recycling park in Alelyckan rubbish becomes valuable; for example, at Återbruket, where building materials and old household appliances are repaired for reselling.

WASTE | BULKY RUBBISH

RECYCLING CENTRES BREAKING NEW GROUND

When it's time to clear out or move, there is often bulky waste that has to be taken to a recycling centre. There is seldom time to think about what could be given away. However, a lot of what is thrown away as rubbish at recycling centres could be valuable to someone else.

The Recycling park in Gothenburg is a new type of recycling centre. Instead of assuming that visitors want to throw things away, staff ask what can be given away. Submitted items are repaired and smartened up and then sold in shops on site. *Stadsmissionen* has a large second-hand shop that sells furniture, clothing and other items that people have given away. *Återbruket* is a shop selling donated building materials, household appliances, etc. There is also *Returhuset,* with products made from recycled materials and a café offering home-made cakes.

The nearest recycling centre may be a long way off and may sometimes have long queues. The Gothenburg region recycling centres have previously only been open to visitors from the actual municipality, but the trend now is for cross-boundary recycling centres, to prevent unnecessarily long journeys. Since 2011, residents from Gothenburg, Härryda, Lerum, Mölndal and Partille have been able to choose which municipality they want to take their bulky waste to. The next step is for the municipalities of Ale, Kungsbacka and Kungälv to join this cross-boundary system.

www.goteborg.se

Waste collection also has an impact on the environment. Using route optimisation, electric power and small flexible vehicles, refuse collection vehicles can be less of a nuisance.

WASTE | ECO-FRIENDLY WASTE COLLECTION

SMALL, QUIET AND MINIMAL TRAVEL

Waste and the environment are not just about minimising and sorting waste. How the waste is collected and handled also plays a part. Refuse collection vehicles travel around residential areas, making it important to reduce driving, emissions and noise. One way is to optimise the routes for waste collection, something that Mölndal municipality is focusing on using a new system of digital transport planning. The distances can be reduced by up to 30 per cent, which cuts down both costs and the impact on the environment.

Refuse collection vehicles have long been a common feature of urban landscapes. In order to make collection services as efficient and environmentally-sound as possible, many different vehicles are being developed and tested in the region. Since 2011, the world's first mass-produced electric hybrid refuse collection vehicles have been collecting waste in central Gothenburg. Following tests, municipal-owned waste company *Renova* is now investing on a larger scale in an electric hybrid refuse collection vehicle that is powered by a diesel engine and an electric motor, separately or together. This combination reduces emissions by over 30 per cent compared with an ordinary diesel lorry. The electric motor makes the vehicle much quieter, as it replaces the diesel engine both when the waste is being emptied and when the vehicle is travelling slowly.

The City of Mölndal and Öckerö municipality will be trying out a smaller refuse collection vehicle that can navigate narrow streets and alleys. The major advantage is improved safety, working environment and service. The small collection vehicle will, for example, spare several hundred customers the inconvenience of reversing refuse vehicles in their local area.

www.molndal.se/english
www.renova.se/in-english

GREENER REGION

How can the Gothenburg region be more environmentally friendly? What is being done in the region's 13 municipalities and what agreements are in place to further environmental efforts? We tell you all about it here.

We wish you happy reading and a greener region!

GREEN GOTHENBURG
STUDY VISITS — SUSTAINABILITY

www.greengothenburg.se

The Göteborg Region Association of Local Authorities

www.grkom.se/english

BUSINESS REGION GÖTEBORG

www.businessregiongoteborg.com

The Göteborg Region Association of Local Authorities (GR) | Gårdavägen 2 | Box 5073, SE-402 22 Göteborg, Sweden
Tel. +46 (0)31-335 50 00 | E-mail: gr@grkom.se | www.grkom.se

ALE | ALINGSÅS | GÖTEBORG | HÄRRYDA | KUNGSBACKA | KUNGÄLV | LERUM | LILLA EDET | MÖLNDAL | PARTILLE | STENUNGSUND | TJÖRN | ÖCKERÖ