For our environment

Protecting the climate,
conserving resources, saving energy

STUTTGART

For our **environment**

Protecting the climate,
conserving resources, saving energy

Introduction

The City of Stuttgart looks back on a long and great tradition of safeguarding our habitat and natural resources. First concerns were raised in the 19th Century as Stuttgart underwent rapid growth in the wake of the industrial revolution, turning the city basin into a cauldron swathed in smog and fumes. Awareness of the significance of woodlands and of public green spaces and the importance of their preservation for the community as a whole was raised at that time by the civic commitment of the Preservation Trust associated with the Waldheim movement, a Christian initiative to establish independently operated woodland centres of recreation for workers.

Stuttgart was also the first city to establish its own Department of Climatology to research ways of improving the flow of fresh air into the city basin. Right up unto the 1960s, inversion weather situations were invariably accompanied by smog. In 1997, the City Council passed the climate protection scheme. "KLIKS" has since been consistently extended to keep Stuttgart true to its well-known adage as the "city nestled between forest and vineyards". Over 39 per cent of Stuttgart's surface area has since been placed under the protection of nature conservation orders; a record in the whole of Germany. Wide ranging innovations have given rise to environmental technologies which not only offer new opportunities for qualitative growth in Stuttgart and beyond, but have also created and are set to go on creating new jobs.

Our aim for the future is to continue to exhaust every possible avenue to achieve sustainable improvement of the city's climate. We are extending the use of renewable energy sources in order to secure a continuous, favourably priced and environmentally friendly energy supply. We are continuing to reduce CO_2 emissions, and making a concerted effort to ensure effective soil and water conservation, to expand our green spaces and renaturize brownfield sites and so preserve recreational areas and a healthy natural habitat for ourselves and for wildlife. We are cutting down on noise pollution, reducing particulate and extending the cycle path network, with all the associated health benefits. We provide grants for energy saving homes, support initiatives by children and young people to make a difference to the environment, run a tree adoption scheme and are appreciative of the personal commitment shown by all Stuttgart's citizens. We use the city's own waste management company to recycle raw materials and we extract energy from effluent. We join forces in the metropolitan region of Stuttgart, we support both national and international projects and share the experience we have gained with other cities and communities.

Nine out of ten residents of Stuttgart affirm that they like living here. Our work is aimed at ensuring that they continue to feel at ease in our city in the years to come.

Let us make use of the available opportunities, let us go on working to make the city and the metropolitan region of Stuttgart the perfect place in which to live and work. Because the protection of the environment and the climate concern us all.

Yours,

Dr. Wolfgang Schuster
Mayor of Stuttgart

Contents

Sustainable urban development

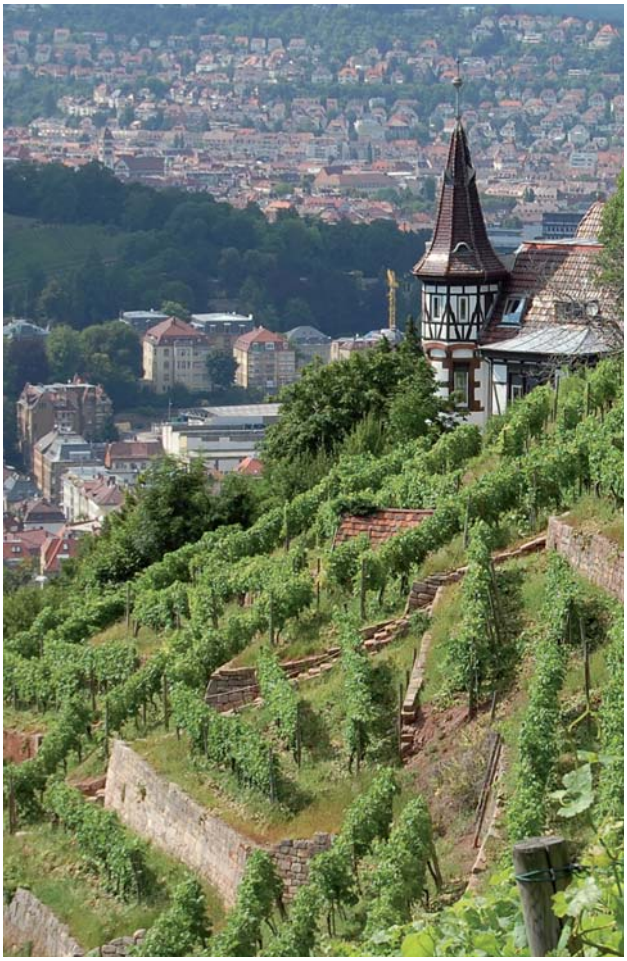
Our mission: Urban – compact – green

Architecturally appealing construction with sparing use of resources

The State Capital Stuttgart is working towards the sustained development of the city based on the principle of "inner development before outer development" which is observed throughout the State. Stuttgart also aims to balance its energy consumption by making use of regenerative energy sources. The focus of its agenda lies in construction and renovation involving sparing use of resources, as well as the promotion of environmentally compatible mobility. Stuttgart also plays an active role in climate protection and noise abatement, as well as improving air quality.

Stuttgart City's land management concept is proof that positive development and restrained land use are compatible. The State Capital sacrifices as little of the natural habitat as possible to building development, the transport network or leisure facilities, pursuing a policy of "land recycling instead of land use". The aim is to achieve an "urban, compact and green" Stuttgart, for instance by "revitalizing" industrial wasteland and brownfield sites.

The site left by the former freight depot in Bad Cannstatt is set to transform itself over the coming years into a modern urban district with a high recreational value. Several hundred new homes, the new City Archive, the innovative Mobility Science Centre, the "Cann" multi generation house, an engineering service centre and four hotels are due to be constructed on the NeckarPark site, creating space for 1,500 residents and up to 2,000 jobs.



Green Stuttgart: Urban vineyard on the Weinsteige hill

The **Bosch-Areal**, the former site of a workshop established by company founder Robert Bosch, had largely fallen into disuse by the beginning of the 1990s. A new concept, widespread refurbishment and the arrival of media companies, cinemas, a literature centre, offices, restaurants and clubs have transformed this inner-city site around the Berliner Platz into a magnet for the public. Listed and renovated old and new buildings are grouped around a covered inner courtyard. Visitors are shielded from the elements by a glass and steel construction measuring some 1,500 square metres.

The former brewery and fruit juice factory site in Vaihingen also remained a disused industrial wasteland of 6.6 hectares up until 2004. As part of a major program of investment, the site became home to a 23,000 square metre shopping centre known as the **Schwabengalerie**, a citizens' forum, a training centre and the RosenparkResidenz, a residential complex of high architectural merit.

One of the focal projects to feature in Stuttgart's urban development is **Stuttgart 21**, the construction of an ambitious underground transit railway station to replace the former head station. Clearance of the existing surface-laid railway track and surrounding land will open up a 100 hectare site for redevelopment, with space for up to 35,000 people to live and work. The Rosenstein and Schlossgarten parks will be extended by 20 hectares, and there will be 30 hectares of additional space for new parks, public squares and streets in keeping with the 'dual urban development' concept.

The Stuttgart 21 project will permit city parks to be extended by 20 hectares

Protecting the green belt

Stuttgart is one of the greenest metropolises, and is planning for a future of diversity over development.

In Stuttgart, no less than 39 per cent of the land is taken up by protected landscapes and nature conservation areas. Hardly any of the city's inhabitants live further than 300 metres from a green space. Even in the city centre, areas of natural vegetation are visible from practically everywhere.

With forests and recreational areas accounting for 25 per cent of its area, Stuttgart is one of Germany's greenest metropolitan cities. Between 1980 and the present day, public recreation spaces have been expanded by around 400 hectares, corresponding to an increase of almost 60 per cent. A major milestone was laid in 1993 with the partial realization of what has become known as the "Green U", an eight kilometre long green tract through the centre of the city. This currently stretches from the Schlossgarten Park through the Villa Berg Park, the Rosenstein Park and the Wilhelma Gardens, the Leibfriedschen Garden, the Wartberg and Höhenpark Killesberg as far as the Feuerbach Heath and Kräherwald Forest. From this year, a further 9.8 hectares are due to be added, completing the "Green U" in the Killesberg area.

A striking feature of the city are its vineyards, which reach right down into the city centre. These provide a 'green lung' to the city and are consequently of great importance for the city's climate balance. 120 hectares of orchards also contribute towards improving the fresh air supply.

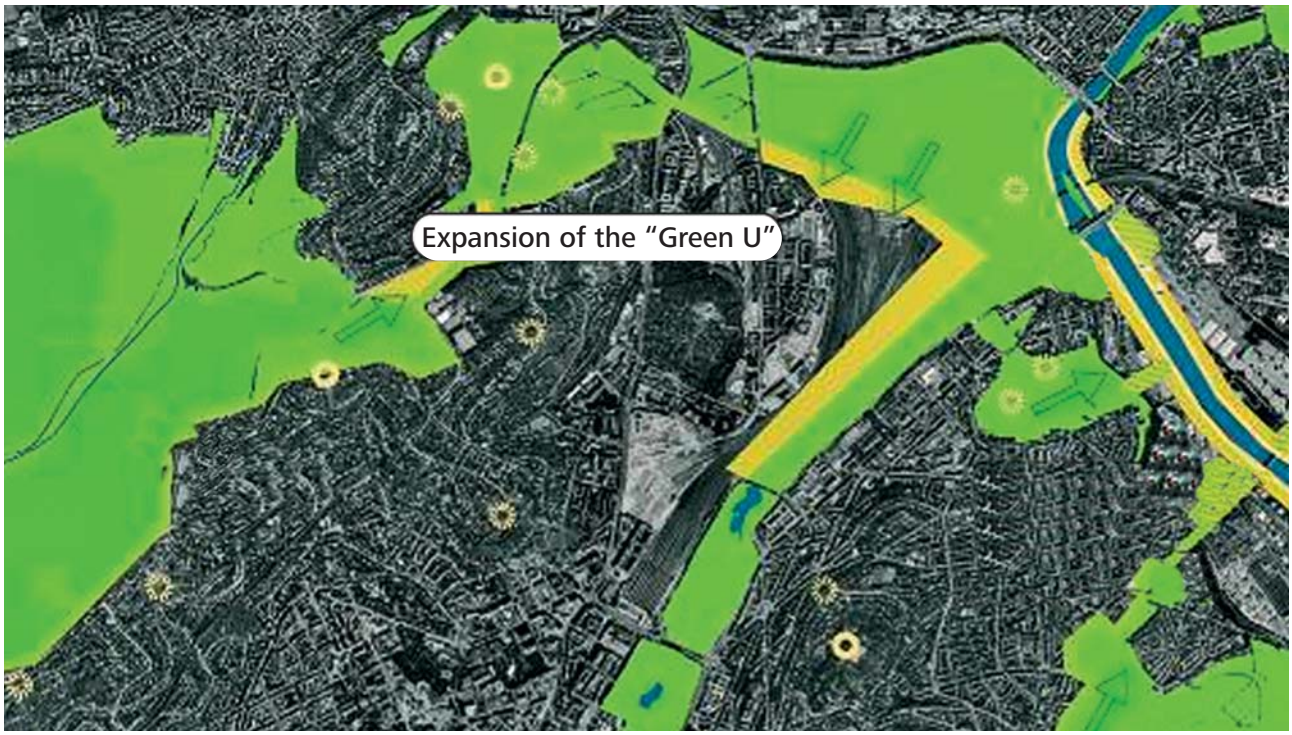
Almost all traffic islands are grassed, as are many of the urban railway tracks: Anyone travelling by urban railway four kilometres through Stuttgart will cover some 500 metres on grassed tracks. Plans exist to augment this by additional grassing and plant species capable of withstanding extensive periods of drought.

Since 2006, Stuttgart has made use of a biotope atlas and biotope network planning. This entails a 15-year assessment of the habitats for flora and fauna on the outskirts of the city to obtain valuable comprehensive information used to help protect existing habitats and create new ones for plants and wildlife. The ground work invested by the municipality is taking hold: working groups have formed in the Mühlhausen, Zuffenhausen, Obertürkheim and Untertürkheim districts, resulting in a plethora of individual activities, projects and biotope sponsorships. The best known of these are the Green Stripe Project run by agriculturalists in Zazenhausen and a large area given over to grazing for Scottish highland cattle as a means of land conservation in the Mussenbachtal valley.

Stuttgart is a city full of colour. The dahlia garden in the Höhenpark Killesberg provides a sea of fragrant blooms from the beginning of August to the end of September. Visitors come in their thousands to enjoy the outstanding floral display on an area of 2,500 square metres every year.

No fewer than 220 species of dahlias are on display between two Indian bean trees and a foxglove tree, and visitors are invited to vote for their favourite to be elected the "most beautiful dahlia". The Höhenpark Killesberg ranks alongside the Island of Mainau as the biggest in the whole of the Southwest region of Germany.

The State Capital won a gold metal in the national contest "Entente Florale – our City in Bloom" in 2008. Sporting the motto "Stuttgart – the Green Experience", the State Capital's parks and gardens, cemetery and forestry department provided an outstanding floral display throughout the city, assisted by members of the community and corporate sponsors.



The "Green U" is an eight kilometre long stretch of green through the centre of Stuttgart.

Stuttgart's friend: the tree

Trees form an essential part of the cityscape and of the local climate. Stuttgart offers the benefit of 5,000 hectares of forest and woodland.

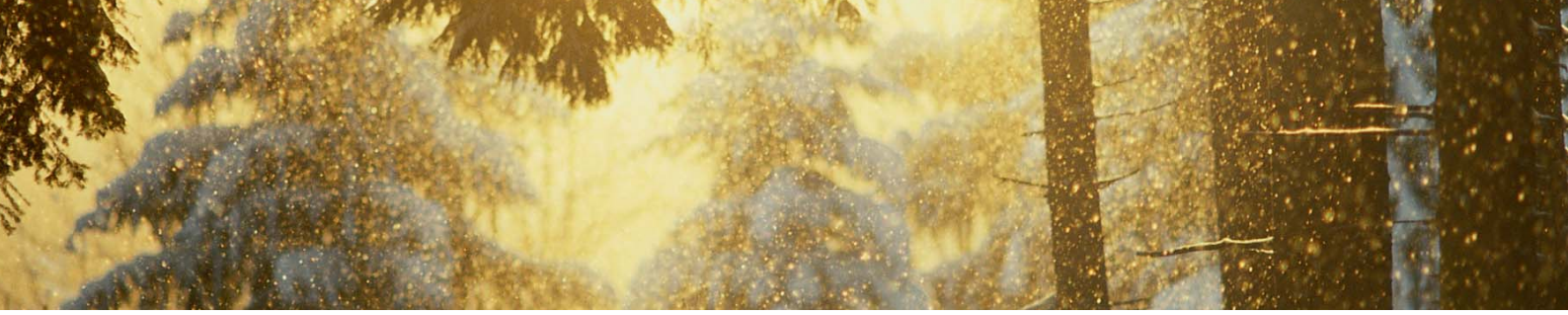
Trees not only embellish the cityscape, they also provide more oxygen, help boost humidity levels and provide welcome shade on hot summer days. When they grow, they absorb carbon dioxide and store it in the timber. Taken together, the trees living in the State Capital store a total of 50,000 tons of CO_2 a year.

In summer 2008, the city was home to slightly over 100,000 trees. Of these, 65,000 are located in parks, 35,000 alongside roads. This total does not count trees on private land or in the 5,000 hectares of woodland.

Stuttgart's forests stretch around one quarter of the city outskirts: on the hills above the city basin from the North around the Northwest to the South. While oak and beech predominate, the forests are home to as many as 50 different tree species.

Stuttgart's woodlands also have an important role to play as a natural retreat for animal and plant species under threat. With the Rotwildpark and Schwarzwildpark conservation areas staked out in 1939, the city

Biological diversity in Stuttgart's forests



enjoys one of the oldest and biggest protected areas in the state of Baden-Württemberg. Added to this are a large number of forest biotopes and the extensive Glemswald nature reserve. Stuttgart is paying greater attention than ever to the maintenance and upkeep of its tree stock, with a total of 1.5 million Euro spent in 2007. Infrared technology can be used to help localize sick trees. Between 1983 and 1999, an aircraft was deployed every five years to take thermographic shots of Stuttgart to highlight the condition of the vegetation in green belt areas.

Stuttgart's forest has been certified since 2001 in line with the so-called Helsinki criteria, according to which the city undertakes to ensure the vitality of the forest eco system, to protect biological diversity and to ensure that the social and economic (furniture, paper and firewood production) role of the forest is maintained. Stuttgart's forests grow around 100 cubic metres of wood every single day. The city is vigilant in ensuring that no more than the volume of new wood growth is ever harvested.

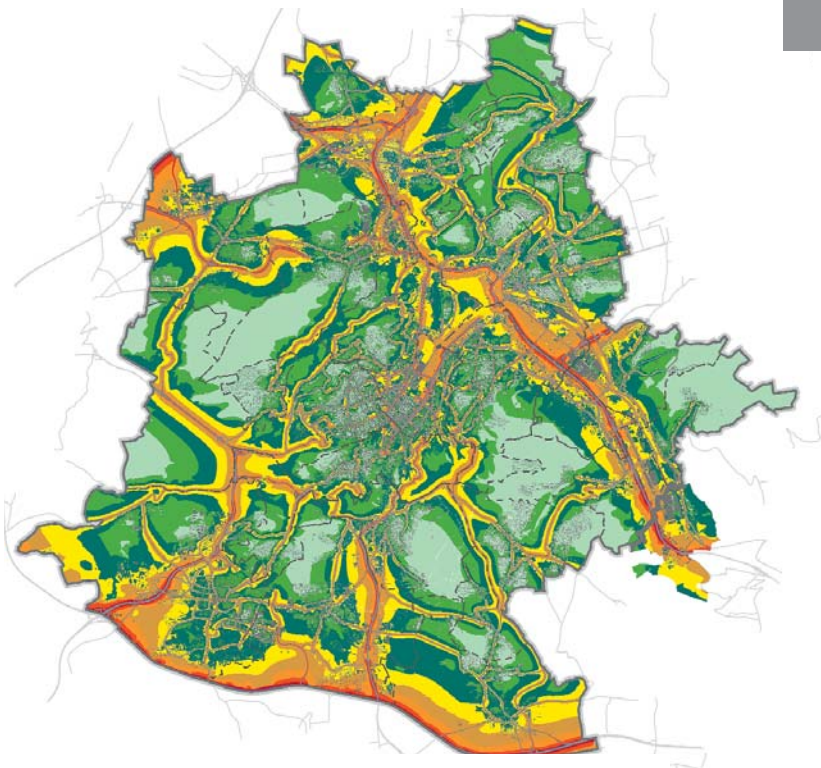
Idyllic Stuttgart parkland setting at sundown

Action plan to counter noise pollution

Working hand in hand with communities, the city aims to curb noise polluters

Noise can make us ill. 60 decibels – corresponding approximately to the noise level of a main highway – can give rise to stress symptoms or even cause heart and circulatory disease. In Stuttgart, there are around 25,000 people living in areas in which the noise level exceeds 60 decibels taken on average over the day, and some 5,000 people are also subjected to more than 60 decibels at night. Stuttgart takes this problem very seriously. As early as 1996, the Stuttgart City Council took the first decision to establish a noise abatement plan. The European Union passed its Environmental Noise Directive in 2002, in which it required member states and communities to draw up noise abatement action plans for particularly loud roads, stretches of railway, airports and industrial sites.

Initially, the degree of noise pollution must be collated and illustrated in noise maps. These are used to render the noise "visible". They are distinguished according to noise sources and certain times of day. Noise maps can be used to determine how many people are exposed to particularly high levels of noise – over 55 decibels during the day and over 50 decibels at night. As an example, this noise map illustrates the noise level of street traffic at night (different colours stand for different noise level classes) for the Stuttgart urban area. The enlarged section shows the inner city. The increased noise pollution level along the busy main roads is clearly visible. The maps provide an indication of the main points of attack for combating noise.



This map indicates night time road noise in Stuttgart and forms the basis for noise abatement measures

Stuttgart moved into action already some years ago to alleviate noise pollution in areas subject to particularly high levels. As a result, trucks over 3.5 tons are no longer permitted to drive through Vaihingen. In Zuffenhausen, a soundproofing wall was erected along the B 10 highway to protect the Elbelen residential area. On the B 10/27 in the Zabergäubrücke area, vehicles will be rolling in future on special sound-absorbing asphalt, so called Splittmastix. This is the first use of "noiseless asphalt" in Baden-Württemberg.

As the population of Stuttgart has a decisive role to play in tracking down other sources of noise, regional workshops form a focal component of the noise abatement action plan. Ten workshops were held in the spring of 2008, offering Stuttgart residents the opportunity to debate noise hotspots. The results were evaluated by a team of experts. The Environmental Protection Office is planning to present the noise abatement action plan as a draft in April, after which Stuttgart residents will once again have the opportunity to voice their concerns.

An excerpt from the inner city map showing the main source of noise to be road traffic: the roads marked in red experience noise pollution in excess of 60 decibels

Energy saving and energy efficiency

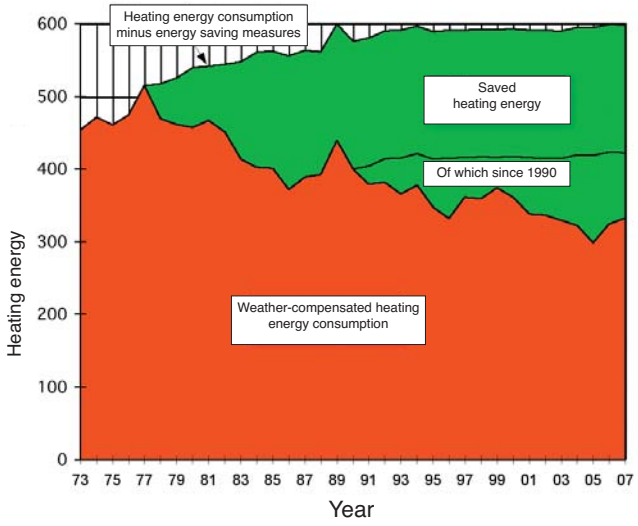
Energy management of public buildings

Since 1977, Stuttgart has succeeded in saving around six million megawatt hours of heating energy. Added to this are 0.6 million megawatt hours of electricity. CO_2 emissions have been cut by 1.8 tons.

Stuttgart benefits from an unusually high level of experience in energy management. The State Capital has made the regulation and reduction of energy consumption in the city's own buildings a priority issue since as far back as 1977. Over the past 30 years, this has enabled a total of six million megawatt hours of heating energy and 0.6 million megawatt hours of electric current to be saved. By way of comparison, an average nuclear power plant takes approximately one year to generate this amount of energy. And in addition, this has meant 1.8 million fewer tons of carbon emissions.

As well as improving its carbon footprint, this proven system of energy saving has also meant financial savings for the city of some 330 million Euros in past years. At the present time, these measures are actually saving Stuttgart 25 million Euro per annum.

The State Capital is set to further extend its energy management policy. In the autumn of 2007, the City Council passed a comprehensive package of measures to reduce CO_2 emissions by 40 per cent throughout the city by 2020. in July 2008, the Council also unanimously resolved to exceed the limiting values stipulated in the Energy Saving Ordinance by 40 per cent instead of the previous 20 per cent in all future municipal building projects and wherever possible also in private buildings. Imposing this requirement will allow the city to significantly reduce energy consumption and consequently CO_2 emissions in newly added building stock and so make a major contribution to reducing running costs.



Energy saving measures have meant a continuous reduction in heating energy consumption since 1977

Energy controlling and energy guidelines

Over 1,400 municipal buildings and over two million square metres of heated space pose a tough energy saving challenge. The guidelines point us in the right direction.

The City of Stuttgart aims to reduce energy consumption in its municipal buildings by at least one per cent per annum. To achieve this goal, a computer-aided system is used to monitor all council properties, either on a yearly, monthly or even daily basis depending on their size and requirement.

An "Energy Service" has been set up to take charge of public buildings, which together account for 60 per cent of the city's total energy consumption. Municipal employees monitor consumption, provide training for building users, optimize operations and develop concepts to minimize energy consumption. In 2007, the Heating Energy Service monitored 167 buildings, the Electrical Energy Service almost 100.

The 1997 Stuttgart Energy Ordinance which contained definitions such as temperatures in different utilization areas of a building and prohibited the use of conventional light bulbs was updated in 2005. When buying office appliances, attention now has to be paid to energy and climate-related issues. New municipal buildings in the city now achieve savings of at least 40 per cent below the limiting values stipulated in the Energy Saving Ordinance.

Steps are also under way to secure thermal protection in the summer with the erection of outdoor sun protection facilities and free night ventilation. Artificial methods of cooling are generally prohibited. In the rare cases where air conditioning is necessary, the required energy should be taken wherever possible from renewable sources (solar cooling or geothermal probes).

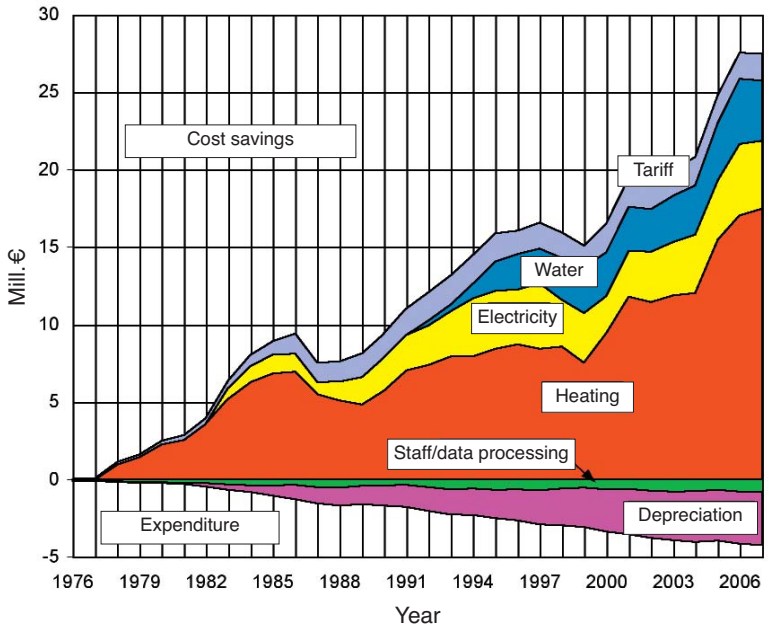
As an increasing number of schools and nurseries are undergoing energy efficiency refurbishment measures, we may expect to save a further 3,000 tons of CO_2 emissions in the future, with an additional saving of 1,630 tons of CO_2 in old people's and care homes.

Award-wining child day care centre in Stuttgart-Weilimdorf

Internal contracting of energy saving projects

The City Treasury and the Environmental Protection Office developed a system of internal contracting in 1995. This idea has since been copied in many other cities, with around 50 local authorities in Germany and Austria having now also introduced the contracting model.

The procedure is a simple one. The Environmental Protection Office funds actions taken by offices and municipal enterprises to reduce their energy consumption. Savings made in offices and municipal enterprises flow back to the Environmental Protection Office until the investment has been completely financed. This method saves around 1.3 million Euro every year and reduces carbon emissions by 6,700 tons. A total of around 9.3 million Euro have already been invested. This provided the means for over 270 projects to be realized, such as improved thermal insulation in schools, more effective lighting control systems in gymnasiums or a new cover for the open-air pool in the Cannstatt mineral spa. The economic and ecological success of the scheme has meant an increase of the contracting budget to six million Euro. There is another positive aspect to be gained in addition to reduced CO_2 emissions: Contracting strengthens the domestic economy, as the majority of projects are contracted out to local building firms and tradesmen.



Cost savings using the contracting model

More efficient generation of energy and use of renewables

Using modern combined heat and power stations, at least 20 per cent of electricity and heat can be generated using renewable energies, totalling a reduction in carbon emissions of almost 8,000 tons per year.

Since January 1, 2008, the city has been sourcing no less than 25 per cent of its total electric power requirement from green energy (compared to only 15 per cent in Germany as a whole). By 2020, at least 20 per cent of the city's power and heat requirement is planned to originate from renewable energy sources. For this to happen, the share of renewables used to produce heating energy must be quadrupled over the coming years. This will mean a reduction in CO_2 emissions of around 28,000 tons per year.

The State Capital owns 40 facilities for the resource-saving generation of energy: six wood-fuelled heating systems, twelve thermal solar systems, three photovoltaic systems and two geothermal probes in old people's homes. Added to this are three heat pumps, a steam turbine, five cogeneration stations run on

Wood fired heating for the green generation of energy is explained to Deputy Mayor Matthias Hahn

sewage gas and eight combined heat and power stations in old people's homes and indoor swimming pools.

Stuttgart's biggest wood fired heating plant is located in Feuerbach. With an output of 800 kilowatts, since 2005 it has been supplying the Louis-Leitz School, the Feuerbach indoor swimming pool and the Feuerbach Fire Station. Using wood chips, two million kilowatt hours are generated here every year. This used to customarily require 200,000 litres of fuel oil – enough to run around 100 single family homes. After only eight years of operation, the initial investment costs of 800,000 will have been recouped.

The wood-fired heating plant gives off as much CO_2 as a normal oil or gas boiler, and the use of dust filters prevents any appreciable dust pollution. The wood is collected during routine land maintenance work, is turned into wood chips on the composting site in Zuffenhausen and transported to the power stations by the container truckload. Fully automatic feed systems push the chips out of the storage bunker into the boiler. As timber only gives off the same amount of CO_2 as it has previously absorbed, emissions are restricted to the processing and transportation.

In a staff residence building operated by the Clinical Centre and in the Rot Community Centre, power plants using wood pellets provide resource-saving energy. Wood pellet systems are either in the construction or planning stage for several nursery schools and other municipal buildings. Pellets are made up of pressed natural wood and are a high-value fuel for automatically fed wood furnaces. The State Capital plans to extend its use of both wood pellet and wood chip fired power plants.

In new building projects managed by the city, the use of renewable energies will be subjected to scrutiny and is planned to be made a fundamental requirement for both new buildings and refurbishment projects. Other thermal solar systems and photovoltaic systems are planned to be used on school roofs.

The fully owned municipal enterprise for sewage management SES operates four combined heat and power stations in Stuttgart's sewage plants with nine gas motors. These process the biogenic energy carrier sewage gas. Germany's first sewage gas fuel cell was commissioned in November 2007 in the Möhringen sewage plant. The main sewage plant in Mühlhausen now accommodates a new sewage sludge combustion plant in which around seven million kilowatt hours of carbon-neutral electrical current are produced a year in a gas turbine.

Solar energy

1,685 hours of sunshine on average in Stuttgart are waiting to be utilized every year. The region is better placed to profit from the boom in the solar industry than almost any other.

Photovoltaics is a booming sector of industry: in 2007, the turnover generated by the German solar power industry increased by 23 per cent to 5.5 billion Euro. Compared to the previous year, around 45 per cent more solar cells and over 50 per cent more solar modules were produced. The boom seems set to continue, as the sector aims to produce three times its present output by 2010. By 2020, the solar industry could employ a workforce of over 100,000.

With 18 suppliers, seven solar module manufacturers and six wholesalers, the Stuttgart region is a centre for the solar industry. Local research institutes are also set up to permit successful cooperation between science and industry. The Centre for Solar Energy and Hydrogen Research Baden-Württemberg, for instance, joined forces with the University of Stuttgart to develop the solar thin-film technology CIS. This entails the direct transmission of solar cells on a low-cost substrate material (glass, metal film, plastic film). These cells are up to 100 times thinner than the standard crystalline equivalent.

The city makes its own roofs available to private investors in the photovoltaics sector free of charge. To date, 17 power plants with a surface area of 4,560 square metres have been set up. Schools, associations and nine private users have taken up this offer. The plants generate 513 megawatt hours of electrical current, saving 7,000 tons of CO_2.

In addition, a 30.000 square metre photovoltaic power plant is being installed at the New Trade Fair Grounds, which will be the largest complex of its kind installed on buildings anywhere in Germany.

A photovoltaic plant is being installed on the roofs of the Stuttgart Trade Fair Grounds at the beginning of the year

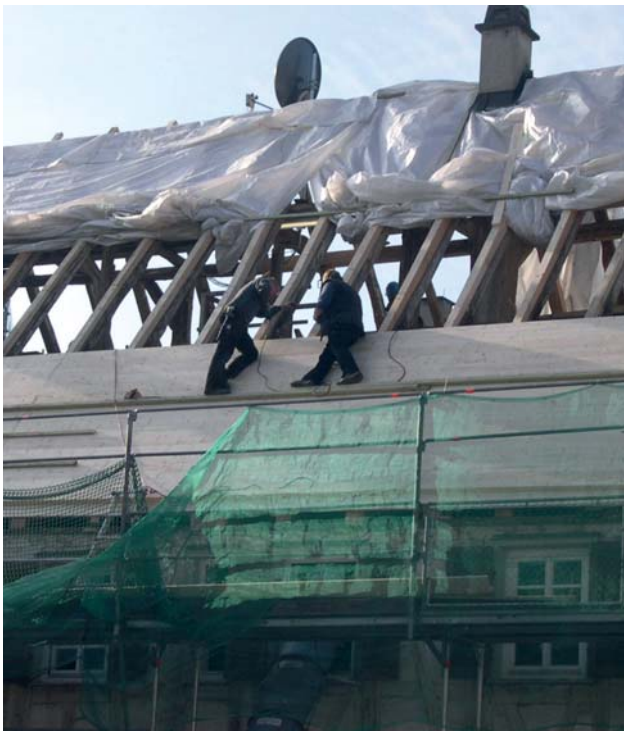
The Municipal Energy Saving Program and energy regulations for private investors

Residents aiming to build or renovate a home benefit from the Energy Advisory Centre and the energy saving incentive program.

The Stuttgart Energy Saving Centre (EBZ) was born out of an initiative by the Energy Round Table in the Environmental Protection Office. Its function is to advise home owners, landlords, tradesmen and architects on aspects of low-energy building. If required, the team of experts are able to provide energy certificates and detailed expert reports. The EBZ is a practical example of successful partnership between the public and private sectors.

Residents aiming to build or renovate a home using resource saving technologies may also be eligible for subsidy by State Capital Stuttgart. Around 1,100 homes have been refurbished to the latest energy consumption standards in Stuttgart since 2001. Between 1998 and 2006, the Municipal Energy Saving Program approved subsidies to the tune of around 12.6 million Euros. In total, the city invested around 86.7 million Euros. This incentive program helps to save over 12,000 tons of CO_2 a year.

The City of Stuttgart imposes more stringent regulations on energy standards in buildings when selling municipal land, drawing up municipal building contracts and for all newly constructed municipal buildings or refurbishment projects. With a view to the development of energy prices, steps are taken to analyse which savings are worth while and where the severity of requirements needs to be increased. The primary energy requirement for heating, hot water and electricity in new buildings must already be 40 per cent lower than stipulated in the current national Energy Saving Ordinance (EnEV). Stuttgart provides grants of up to 21,000 Euro per residential unit.



Incentive programs support energy saving refurbishment projects

Environmentally friendly traffic development

Stuttgart gets into gear to combat particulate.

There were more than 320,000 registered vehicles on Stuttgart's roads in 2007 – twice as many as in 1970. An ever growing number of road users have to cope with ever more restricted space for traffic. The result: Congestion on main roads which produces considerable air pollution. Road traffic is also the cause of one third of the particulate in the air.

The State Capital is particularly concerned to free the city of cars and trucks and to reduce emissions. It has undertaken a number of measures directed specifically at adhering to prescribed limiting values for particulate and nitrogen dioxide even on the most busy of its streets. Since November 2004, a Council Select Committee for the prevention of air pollution has been in operation. The Clean Air Action Plan drawn up by the Regional Administrational Authority has been in force since January 1, 2006.

Since the launch of the "Environmental Zone Stuttgart" scheme on March 1, 2008, certain vehicles are prohibited from entering the city centre. Vehicles are classified according to four pollution groups – from unlimited access to complete prohibition. The rules apply independently of whether the current air pollution level is high or low. Stuttgart also practices what it preaches: the municipal vehicle fleet will be made up in future of environmentally friendly vehicles using alternative methods of propulsion. There are already twelve municipal vehicles which run on natural gas and one using hybrid technology.

When the city procures new vehicles or spare parts, then these may only be of an eco-friendly low energy variety. This applies in particular to the bus fleet used by Stuttgarter Straßenbahnen AG (Stuttgart Public Transport Company SSB).

Motif used for the municipal clean air advertising campaign

Expansion of local public transport network

Public means of transport. Fast, safe, clean.

In the State Capital and the Stuttgart region, local transport networks are run by the national railway operator Deutsche Bahn (DB), the Stuttgart tram operator SSB, the Württemberg railway operator WEG, Regional Bus Stuttgart and a variety of municipal and private transport companies working under the umbrella of the Transit and Tariff Association Stuttgart (VVS). The VVS has been ensuring safe and convenient mobility in the Stuttgart region for the past 30 years. It now provides services to almost twice as many passengers (around one million every day) than at the time of its formation. Six commuter railway lines link Stuttgart to the outlying regions over 177 kilometres of track. At the main railway station and at the main stops in the city centres, these trains often run as frequently as one every two or three minutes.

Stuttgarter Straßenbahnen AG provides a closely meshed public transport network: 462 buses and light rail trains transport passengers backwards and for-

On the right ecological and economic track: the Stuttgart light rail lines

wards to the various districts over routes totalling around 850 kilometres. All SSB service buses bear the green particulate certification, indicating that they comply with high ecological standards.

Plans are in place to further extend the local public transport network. Tram line 15 was converted in 2007 into a light rail line. The last 3 kilometre stretch of the 13 kilometre line from Ruhbank (the TV tower) to Stammheim will be completed in 2010.

The SSB is the first transport operator in Germany to use four-axle articulated buses in regular service. Running on two heavily used lines in the Southwest region of Stuttgart, these 20 metre "Capacity" models are 1.5 metres longer than normal articulated buses, making room for 32 more passengers (total 178). The buses also come with extremely good eco credentials and emission values exceeding the "Euro 5" standard. The Council and the SSB are also planning initial test running of the new Mercedes-Benz Citaro G BlueTec Hybrid kneeling articulated bus developed by Daimler AG in the foreseeable future. The diesel drive system used halves the weight of the engine to around 450 kg. It no longer operates as a continuous drive unit, but is a generator drive for temporary power generation. This electrical power and that saved from the regenerative braking system are stored in lithium ion batteries on the Citaro's roof. Supplying actual traction to the wheels are four electrical wheel hub motors at the centre and rear axles. At the World Mobility Forum in Stuttgart City Hall, the bus was awarded the 2008 DEKRA Environmental Prize.

The "Zacke" rack-and-pinion railway also carries bicycles

Other local public transport services offered in the city include high-level platforms allowing stepless access to the vehicles or elevators at stops. During off peak travel times, it is also possible to transport bicycles in urban railway trains free of charge.

To summarize: Urban railways and buses are considered a fast, safe and clean method of public transport. Customers are satisfied with the services on offer and make frequent use of them. Taking an average of all Stuttgart residents, almost 200 times a year each. And gratifyingly, the tendency is rising.

Improving the traffic flow in the city

Stuttgart has declared war on traffic congestion. New tunnels and the Integrated Traffic Management Centre prevent around 30 kilometres of queues every day.

Traffic concepts and structural plans are a way of helping to improve the flow of private road traffic. A project control group made up of representatives of the different Council factions, of different municipal service providers, of the Stuttgart Association of Local Government Authorities, the SSB and VVS are working together to have this citywide traffic development concept in place by the end of 2010.

In the West of Stuttgart, there are 1,000 too few car parking spaces for residents. A parking space management system is in place to improve the living and working situation for residents and businesses. Less illegal parking and fewer vehicles looking for spaces ensure improved safety for pedestrians and cyclists. Plans exist to introduce a mixed system of residents parking costing 30 Euro per year alongside metered parking for non-residents. Any revenues raised will go to finance new parking facilities.

Road traffic is controlled from the Stuttgart Integrated Traffic Management Centre

Since May 2006, the main B10 road has been routed through the Pragsattel Tunnel, relieving the strain from the most highly frequented cross route through the city centre.

Over a hundred thousand vehicles cross the intersection of the main federal routes 10, 27 and 295 every day. This heavy incidence of traffic now flows freely through the city on the B10 in two tunnels underneath the Pragsattel junction.

Two additional projects along the B10 are also part of the overall concept. The Leuze tunnel, which provides an opportunity to turn directly left towards the city centre coming from the Esslingen/Waiblingen direction, will be constructed from 2010, alongside another project, the Rosenstein Tunnel, at around the same time. However, traffic approval for the reconstructed Leuze junction will be granted before the Rosenstein Tunnel, planned for completion in 2015, goes into service.

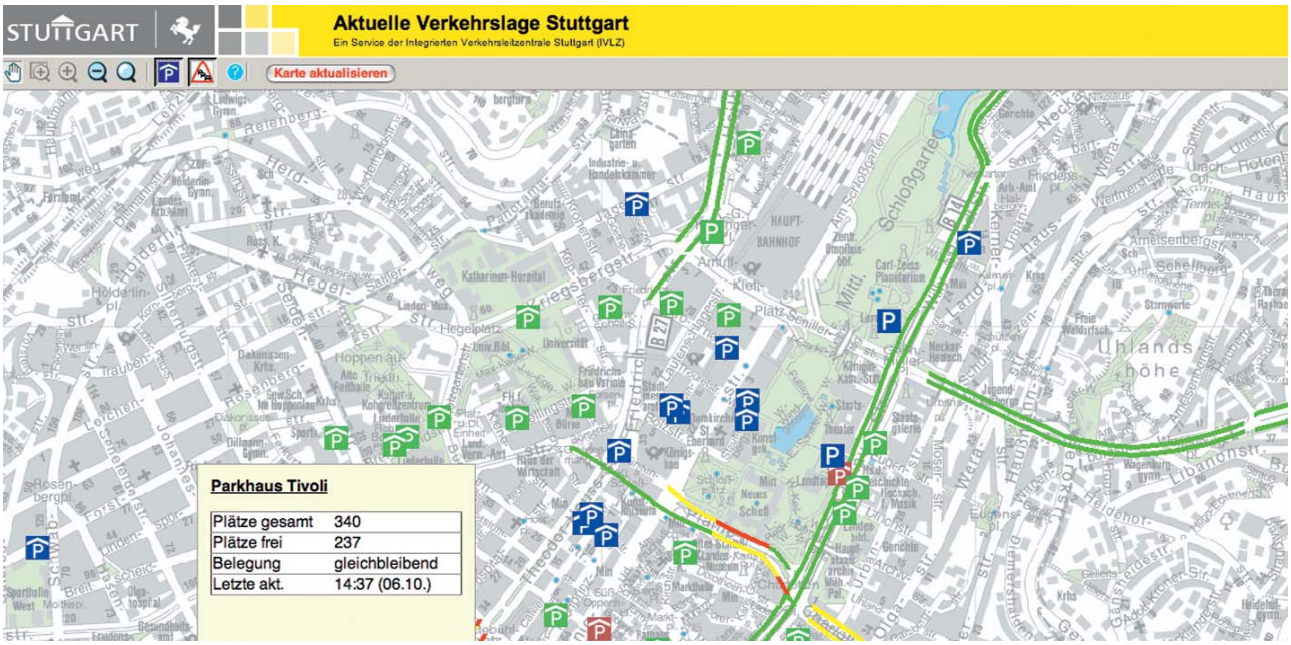
In the centre of Stuttgart, the main federal highway no. 14 will be routed partially underground in the area of the Konrad-Adenauer-Straße from 2013 onwards. Tunnel excavation is set to begin still this year. Completion of the tunnel will mean only 40,000 vehicles instead of almost 110,000 driving above ground. Along what is known as the "cultural mile" (encompassing the Baden-Württemberg House of History, the Opera House, Theatre, State College of Music and the Performing Arts, the State Library, the State Archive, State Gallery and City Library), an attractive and lively city boulevard will be constructed. An urban planning competition will decide how Konrad-Adenauer-Straße and the adjacent area will be developed.

The State Capital attracted nationwide attention in the run-up to the Football World Cup 2006 with its Integrated Traffic Management Centre or IVLZ. The IVLZ actively intervenes in the daily running of transport activities in the city up to 21 times a day (around 15 of these using traffic light programs). It provides information for road and public transport users by means of dynamic information boards or by radio, indicates alternative routes or guides spectators or concert-goers towards the nearest available car parking spaces. All these actions help the IVLZ prevent up to 30 kilometres of queues every day.

There are four partners working to collect information on the traffic situation:

- The Stuttgart Public Safety Office
- The Stuttgart Civil Engineering Office
- Public transport operator Stuttgarter Straßenbahnen AG
- The Stuttgart Police Department

The IVLZ is housed in the Security and Mobility Management Centre (SIMOS) in the district of Bad Cannstatt. This building is also home to the Fire Department and Emergency Services and to the Operational and Administrative Headquarters of the State capital. One representative of each of the IVLZ partner organizations works each shift in the control room. Their physical proximity permits the fast exchange of information. Since the summer of 2008, information provided by the IVLZ on the latest traffic situation in the city is available on the website www.stuttgart.de. Green, yellow and red lines emulating the colours of a traffic light indicate the flow of traffic on the arterial roads (such as the Neue Weinsteige). The data is received by the IVLZ from measurement stations along the roadside and also through GPS signals transmitted from the city's 700 taxies. The internet service provides information on which car parks or car parking areas still have spaces. Further measurement stations throughout the city and additional video cameras as well as a further 40 additional information boards are planned for installation in the future. Plans also exist to improve mobility management with the region and to integrate surrounding communities into the network. The development of a joint traffic strategy is planned in cooperation with the State of Baden-Württemberg.



Current car park occupancy can be accessed on www.stuttgart.de

Cycling in Stuttgart

Ambitious projects are set to increase the proportion of cycle traffic relative to overall road traffic in Stuttgart to 20 per cent in the near future.

Plenty has already been achieved for cyclists in Stuttgart: since 1988, the cycle path network has been continuously expanded from 54 to 140 kilometres (for example in the Neckar Valley). A policy document published in 2004 proposes a long-term target to increase the proportion of cyclists to 20 per cent of total traffic, listing a catalogue of measures for achieving this goal. These include the installation of more signposts, marked improvement of route safety and stepping up winter services.

Bicycles can be safely locked to cycle stands in practically all underground and urban railway stations throughout the city. A large number of public transport stops in the Transit and Tariff Association Stuttgart

Cyclists are set to make up 20 per cent of future road traffic in Stuttgart

(VVS) region are also equipped with storage facilities for bicycles, many of which are under cover. At the Main Station and the Schwabstraße stop, bicycles can be parked in 30 mini garages ("bike boxes"). At a cost of five Euro per month or 50 Euro for a whole year, bikes can be accommodated here safe from would be thieves, wind and weather. At the railway stations in Vaihingen and Möhringen, there are bicycle service stations with parking spaces for around 100 bicycles each. Plans exist to further expand facilities for the safe and convenient storage of bicycles.

Since July 2007, it has been made even easier to switch to pedal power. Around 450 rental bikes are available on call ("call a bike") at 65 locations – for example at public transport transition points, near to institutions or shopping facilities. No fewer than 1,500 registered users now regularly call up a bike by phone – a total of 21,500 times in 2007 overall, often at weekends or at night when the last tram has left. Most rent a bike for just under 30 minutes or else for the whole day. The first 30 minutes are free of charge, after which the cost is eight cents per minute, or a reduced rate of six cents with a rail card.

The City of Stuttgart is also championing electric pedal-assisted bicycles. Here, an electric motor provides added thrust when the rider treads the pedals. This provides welcome assistance when negotiating Stuttgart's hilly terrain – the Weinsteige artery road alone entails a climb of 200 metres. So called "Pedelecs" ("pedal electric cycles") can reach speeds of up to 25 kilometres per hour. The batteries are charged using a standard socket, and have a range of 40 to 50 kilometres. Travelling 100 kilometres costs an average of 35 cents. Unlike the "call a bike" scheme, these cycles belong to private owners. Anyone signing a four-year rental agreement can rent a bike for somewhere in the region of ten Euro per month (retail price: 1,800 Euro). In the summer of 2008, the "Pedelecs" were

Mayor Dr. Wolfgang Schuster uses the "Pedelec"

scientifically tested in the Rohrer Höhe old people's residential complex – with assistance of the University of Stuttgart.

Since 2006, a cycling action day (Sattel-Fest) has taken place every year in Stuttgart. In 2007 and 2008 alone, around 30,000 visitors picked up useful tips on the subject of cycling in and around Stuttgart. The city administration, associations such as ADFC, the Stuttgart Friends of Nature Cycle group, the Stuttgart Police Department as well as bicycle manufacturers also provided interested residents with advice on bicycle equipment and safety. Anyone warming to the idea of pedal power can then find about the most picturesque, fastest and most sporting routes through Stuttgart's urban area using the Internet route planner. Stuttgart put together the route planner in cooperation with the Transit and Tariff Association Stuttgart (VVS) in 2006. The planner also provides information on how to best combine cycling and public transport. Cyclists using satellite route finding systems can also transfer the route in the form of a GPS track.

Cyclists get together for the "Sattel-Fest" action day

Soil conservation

Stuttgart makes more of its soil – as a resource far more precious than just a "soft location factor".

Because it acts like a buffer, the soil in our forests and urban areas is an integral component in the natural cycle: It absorbs a portion of the occurring pollutants before they are able to contaminate the ground water, and gradually degrades them. Particularly in our towns and cities, soil fulfils other crucial location-related roles, for everyday living, for our industry, traffic and water conservation. The State Capital looks on the soil not merely as a ground surface, but as a space with an essential ecological function.

The urban district of Stuttgart is made up in the main of three natural spaces.

- The Filder plain
  (a fertile plain whose soil is made up of loess loam)
- The valley basin
  (a basin hollowed out by the Nesenbach stream comprising large areas of forest and soil similar to the Filder plain) and
- The Neckar valley
  (the density of population has left hardly any natural soil in this area)

A good 100 years ago, just six per cent of the ground surface had been developed in what is today's urban area. The mid 20th Century saw enormous expansion of the existing settlements and public thoroughfares on the city's outskirts – with up to as much as 100 hectares developed year on year. In 2001, an analysis of urban development predicted that Stuttgart's entire surface area would be completely populated by 2080 if the present rate of development were to continue.

Since this date, a marked slowing down of this process has been in evidence. Between 1997 and 2007, building development and transport infrastructure land use has grown by only 362 hectares: underpinned by concentration and re-use. Examples of a program of brownfield site regeneration in Stuttgart include the redevelopment of the former brewery and fruit juice factory site in Vaihingen, as well as former Bosch site at the Berliner Platz described in Chapter 1.

Mother earth in the very best hands in Stuttgart

Working in partnership with the State of Baden-Württemberg, in 2001 the Environmental Protection Office launched the Soil Conservation Project (BOKS) – preceding the national Soil Conservation Act by three years. BOKS sets out to render land use plannable, measurable and controllable. Its core precepts are:

- To record the quality of the soil in terms of surface area and to balance its utilization in terms of quantity and quality. A point system introduced specifically for the program (the "soil contingent" comprises 1,000 index points) permits this valuable resourced to be properly budgeted.

- To sound out flexible room for manoeuvre for development planning processes – BOKS is not there to forestall decisions or block planning projects, but to help reach sustainable decisions.

In analogy to the principle of "inner development before outer development", BOKS seeks to ensure that as few greenfield sites as possible are sacrificed to building projects, with a view to conserving 88 percent of the resource as natural habitat. The plan envisages reducing new land uses to the point where requirement can be covered on existing developed sites. The pointers are positive. Between May 2006 and April 2008, there has been an increase of six soil index points, indicating that overall, the BOKS program is so far on target.

Access to (very) good soil is not categorically prohibited. However it does impact on other planning, in as far as it uses up the "soil contingent". Nature conservation areas or flood protection areas are strictly taboo.

A council resolution passed in 2006 made BOKS a binding constituent of Stuttgart's land use planning procedure. The concept is implemented by the city, an engineering consultancy bureau and the Geographical Institute of the University of Stuttgart – with the support of an advisory board of members of the Ministry of the Environment and Transport, the State Office for Environmental Protection and the University of Hohenheim.

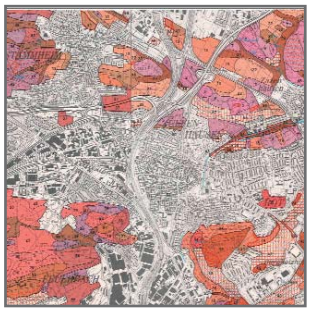
Sustainable land use management

To facilitate internal development, an organization known as "Sustainable Brownfield Development Stuttgart" (NBS) was set up in 2002. Its aim is to lay out strategies and tools for making several millions of square metres of floor space usable. The brownfield management project has so far recorded over 400 locations with around 500 hectares of building land. Information on around 70 locations is published on an Internet platform.

Stuttgart soil atlas

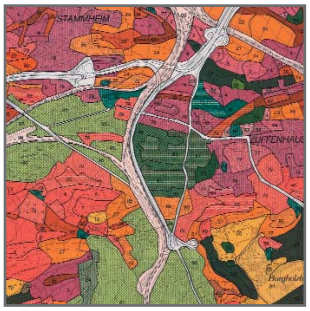
General soil information

Geological map



Soil map

Urban soil mapping

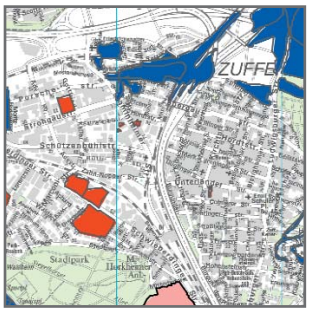


Stuttgart soil map

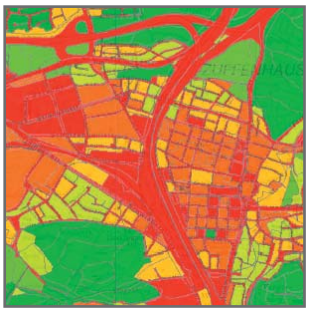
Collation and assessment of soil functions

Filters, water cycle, vegetation

Man-induced changes



Harmful changes



Soil sealing

Soil quality planning map

Soil quality
0 Absent
1 Very low
2 Low
3 Medium
4 High
5 Very high

Soil quality

Agriculture, open orchard meadows and horticulture

120 hectares of orchards

The nearly 5,000 hectares given over to agriculture in Stuttgart almost matches the size of the city's woodlands and forests. However, compared to 1980, agricultural land as a proportion total surface area has shrunk by almost five per cent – equivalent to a reduction of 1,500 hectares. In order to safeguard and develop agriculture in the metropolitan district of Stuttgart, the City Council set up the "Agriculture Concept Working Group", which is made up of members of the Real Estate and Housing Office, the office of Urban Planning and Urban Renewal, the Environmental Protection Office, the Parks, Cemeteries and Forestry Office and the Farmers Association of Greater Stuttgart.

There are around 120 hectares of orchards in the State capital. Four of these areas are protected by land conservation orders (Greuterwald, Weidachwald, Zettachwald and Häslachwald). Varied use is made of the harvest: as fresh fruit, for drying, as apple juice, cider and apple brandy. The orchards also provide fodder for local agricultural use, and as a location for beekeepers to keep their hives. The wood produced by the fruit trees is also highly prized by the furniture industry as a raw material. And importantly too, adjoining areas of orchard provide a natural habitat for up to 450 species of plant life and 3,000 types of insects and animals. Their changing appearance with the seasons makes them an ideal recreational area for the city's population.

Ecologically maintained allotment areas also make a contribution towards taking care of the soil. Around sixty such areas in Stuttgart account for over 100 hectares, providing allotments for over 3,000 residents.

The Solitudeallee allotment complex has received multiple awards, including a gold medal in the prestigious national "Urban garden" contest. All the allotments are designed to be open, without fences, and provide an ideal environment for spending quality time. The 73 summerhouses erected on the plots are harmoniously designed, and wide-ranging soil conservation measures reflect the ecological ethos of the responsible association. The clubhouse has a power supply produced using regenerative energy (photovoltaics), with 35 square metres of solar panels on the roof.

Children learn the careful enjoyment of nature in Stuttgart's "School Garden Network" scheme, which encourages school children to gather experience with native plant and animal wildlife. The first training event held in 2007/2008 hosted teachers from 13 schools, providing a program of information on soil care, irrigation and useful creatures in the garden over a three day period. Pupils taking part in the scheme can call on advice from local experts and associations in the planning and care of their own small natural oasis.

The "School Garden network" teaches children learn how to work with nature

Water protection

The State Capital is alive with natural mineral water springs, coming a close second only to Budapest.

The incidence of natural mineral water in Stuttgart is the greatest anywhere in Europe, with the exception only of Budapest. 44 million litres of mineral water gush from springs in Stuttgart every day. The water – in some cases containing carbonic acid – is tapped at twelve of these, and used by the city to supply swimming pools in mineral spas, therapy centres and three of eleven public drinking fountains. Another 250 fountains adorn the cityscape. The creation of a healing spring protection area is designed to permanently safeguard the quality of the ground water. Added to this are a series of other water protection areas (Mahdentalquelle, Bruderhausquelle, Schattenquelle, Steinbachsee, Katzenbachsee, Blauäcker, Rauns). Their function is to help minimize the risk to the ground water and to safeguard the incidence of ground water.

Drinking fountain at the Leuze spa

Streams, rivers and lakes

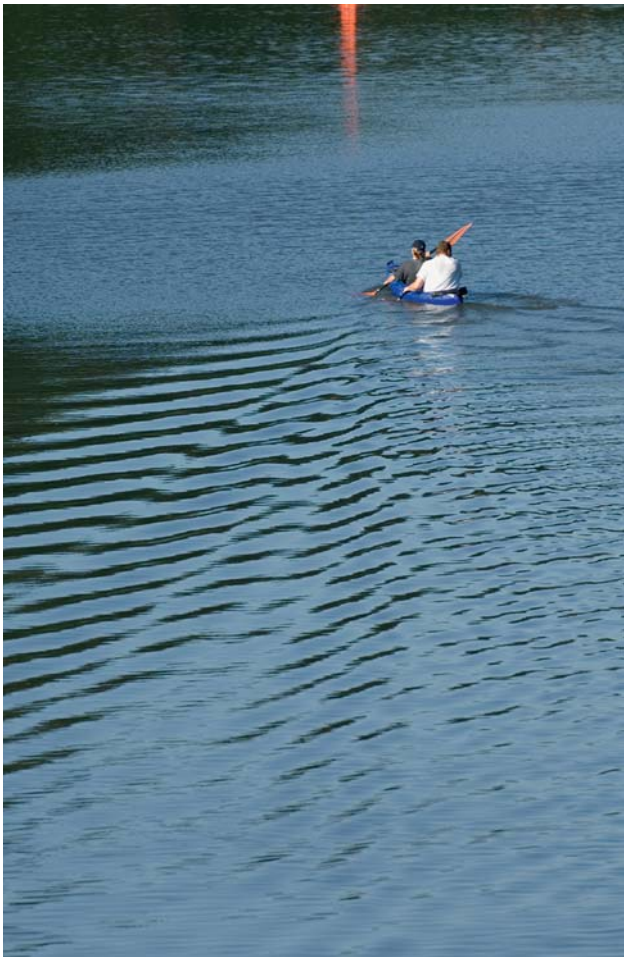
Successful renaturization of rivers

The city is home to some 170 kilometres of streams and rivers as well as over 63 hectares of lakes. The best known of Stuttgart's waterways are the River Neckar, the Max-Eyth-See, and the nature reserve lakes Neuer See, Bärensee and Pfaffensee. Stuttgart is also marbled by streams and countless smaller lakes and ponds.

To maintain surface waterways in a good ecological and chemical condition, the City of Stuttgart has set up a comprehensive program of measures. These include the renaturization of moving waterways, restoring technically developed streams to their natural state, restricting the drawing of water, maintaining a minimum flow in streams and preserving the natural flow course of rivers.

The work has produced initial successes. The Neckar in the Stuttgart area has been upgraded to quality category II (moderate pollution), with 41 species of fish now present compared to only 23 in the 1970s.

Along the Neckar, a new branch of the river is being created on the site of the former shipping channel by the name of "Saugraben" in Hofen, which was filled in. The new waterway is designed to provide a new habitat for species of fishes and amphibians which used to inhabit the Neckar flood plain. The Municipal Sewage Utility Enterprise (SES) is implementing the project in cooperation with the Environmental Protection Office and the Parks, Cemeteries and Forestry Office. This widespread renaturization project is designed as a counterbalance to construction of the Hofen sand trap and screening plant.



The Neckar is enjoyed as a recreation and leisure area

The Feuerbach stream to the North and West of the city has been renaturized since the mid eighties. With 15 kilometres, it is Stuttgart's longest stream, around four kilometres of which runs underground. At the beginning of the 1990s, a "replacement area" of around 700 metres in length was produced in Mühlhausen. By 2006 around 980 metres had been returned to a close-to-nature condition, with 400 metres still to follow.

Since November 2008, Stuttgart's Ramsbach stream has been one of the city's renaturized waterways. Over a stretch of around 1.6 kilometres, a fully functional flood plain was created with a close-to-nature water course. The Ramsbach rises in Degerloch and flows into the River Körsch near Plieningen after around 5.2 kilometres. Both the base of the stream and the banks had been concreted over for almost 80 years.

Renaturization of the Feuerbach stream before and after

State approved healing springs

The Leuze and Berg mineral baths are unique to Stuttgart

Stuttgart without its mineral spring waters? Unthinkable. In 2007, over 1.3 million people came to the Leuze, Cannstatt or Berg mineral baths to relax and regenerate. By using what is now known as the flow-through principle, the cold water pools do not require chemical additives. The warm water pool in the Leuze spa benefits from the addition of 0.6 milligrams of chlorine per litre in line with DIN guidelines and is also phosphatized.

The mineral baths are so popular that a dedicated community of regular guests has been formed for example at the Leuze, who call themselves the "Leuzeaner". The first of them can be seen punctually at six in the morning queuing in front of the baths, there to swim their designated number of lengths, wake up with a dip in the cold pool or exchange the latest local gossip in the sauna. On their way out, guests like to fill a bottle with the healing spring waters containing high levels of carbonic acid: This is the quality of life Stuttgart residents can enjoy.

The State Capital is very careful to look after its natural heritage. A measurement program has been set up to monitor and analyse the water quality. Happily, there is no chemical pollution. The Leuze mineral baths were awarded the quality seal "Wellness Stars Therme" with four stars by the Baden-Württemberg Association of Mineral Baths in September 2008. This required the baths to undergo stringent quality controls. The sauna suite, water pools and the ambience as well as the quality and individuality of the architecture were all instrumental factors in achieving this award.

One of three mineral spa baths in Stuttgart: the Leuze

Drinking and ground water

Careful treatment of ground water and saving CO_2

The quantity and quality of local ground water supplies are protected using sustainable methods, by ensuring that as little ground water as possible is drawn (for example for use as service water). The soil protection concept BOKS in place in Stuttgart provides a guideline for the protection of near-to-nature soil usage permitting the reformation of ground water (described in detail in Chapter 4).

The average Stuttgart resident consumes around 122 litres of drinking water per day, which is equal to consumption around the country. Water consumption is currently being reduced in the State Capital by up to one per cent every year. Further reduction of drinking water consumption is planned by increasing rainwater utilization. Stuttgart's water network is also characterized by a high level of efficiency, with 92 per cent of water reaching end users. This represents half the water loss sustained by other areas of Baden-Württemberg.

The State Capital draws around half its drinking water from the Danube (utility company Zweckverband Landeswasserversorgung) and Lake Constance (utility company Zweckverband Bodensee-Wasserversorgung). Turbine systems installed as part of state water supply system feed twelve million kilowatt hours into the grid (over one quarter of the overall energy used to run the pumps). In the construction of the Lake Constance water supply plant, the planners provided a low-energy means of transporting the water underneath the Swabian Alb mountains to Stuttgart in a pipeline named the Albstollen. Water turbines ensure the necessary reduction in pressure and at the same time produce 4.5 million kilowatt hours of electrical energy. The aim is to save further pump energy and to draw a fifth of the entire requirement from regenerative sources by 2020. If all previous measures are consistently further utilized, around 15,000 tons of carbon emissions can be saved a year.

Water treatment plant on the Sipplinger Berg overlooking Lake Constance

Waste water treatment

Sewage plants

Stuttgart's sewage plants are forerunners – in more ways than one.

The purification of sewage primarily serves the purpose of protecting the soil and ground water. The four sewage plants run by the Municipal Sewage Utility Enterprise (SES) in Mühlhausen, Möhringen, Plieningen and Ditzingen also generate energy themselves and so make a contribution towards environmental and climate protection.

In Mühlhausen, Stuttgart runs Baden-Württemberg's biggest sewage plant, and one of the ten biggest in the whole of Germany. Its catchment area covers 164 square metres with a population of 1.2 million. This is where 80 per cent of the city's sewage, as well as sewage from adjoining communities is purified. The purified water is then fed back into the Neckar.

Since 2005, a sand and grease trap has removed sediment such as sand, rakings or fine gravel. The rakings are directly thermally utilized. Sand and fine gravel are used as materials after treatment. Grease rises to the top and is removed.

As the sewage plant is not far from the nearest habitation, all parts of the plant are under cover. The exhaust air is captured inside the building and purified in a central exhaust air treatment plant before being released into the atmosphere. To protect local residents from noise pollution, all vehicles travel in an enclosed tunnel.

The pioneering role played by the main sewage plant is due to the fact that sewage sludge has been completely incinerated here for many years. A steam turbine generates around seven million kilowatts of carbon-neutral energy a year, covering a considerable proportion of the sewage plant's own electrical and heating energy requirement. The progressive incineration technique of the "fluidized bed furnace 3" restrains a large number of pollutants or avoids them altogether. Sewage sludge which is incinerated using environmentally friendly methods does not pollute the soil.

The State Capital is investing around 40 million Euros in two new septic tanks. These have been under construction since February 2008. Providing 21,400 cubic metres of sewage space and the relevant machine and service building (to house sewage gas compressors, sludge pumps, desiccating machines, heat exchanges and a combined heat and power plant), they are planned for completion at the end of 2011.

The central elements of the new anaerobic fermentation plant are two cylindrical septic tanks with a diameter of 22 metres and a total height of 32.5 metres. The

septic tanks are sunken eight metres into the ground, meaning that the upper edges of the septic tanks are no higher than the already existing sewage gas holders. Each septic tank provides a sludge capacity of 10,700 cubic metres, which is stirred several times a day. This presses sewage gas through 18 gas lances into the septic tank, creating turbulence which keeps the sludge continuously moving and prevents deposits from settling in the septic tanks.

The organic components of the sewage sludge are transformed into sewage gas in the air-tight septic tanks within 10 to 15 days by means of a fermentation process. This gas used to be burnt away without being used, but its usefulness has now been recognized and harnessed. This combustible gas comprises around 60 per cent methane and 40 per cent carbon dioxide, and has a high energy content. One cubic metre of sewage gas corresponds to a calorific value of around half a litre of fuel oil. From the anticipated six million cubic metres of sewage gas a year, it will be possible to produce around 30 million kilowatt hours of electricity and heat in the new combined heat and power plant. This can be performed using a gas-powered combustion motor which in turn drives a power generator. In this process, both the driving force of the combustion engine and the heat given off by the exhaust gases and the cooling water are used to generate energy. The use of sewage gas combined heat and power plants in all the systems produces 9,550 megawatt hours of electrical current a year and saves 6,580 tons of carbon dioxide emissions. The generated electrical current is fed into the sewage plant's own power supply network. The heat arrives in the power plant's own local district heating system and is used to heat the buildings and septic tanks.

As the gas is no longer released untreated into the atmosphere but instead used as a source of energy, the environment benefits directly. Energy, costs and 6,000 tons of carbon dioxide are saved every year.

In the Möhringen sewage plant, to date power and heat have also been generated from sewage gas in a combined heat and power plant. However, from November 2007, Baden-Württemberg's first sewage gas fuel cell ("HotModule") has been in service. This plant, which cost some 3.6 million Euro to install, is more environmentally friendly as it generates more power and gives off substantially less CO_2 into the atmosphere. The project is largely funded by the Federal Ministry of the Economy and Technology, the utility company EnBW, MTU Friedrichafen GmbH and the State of Baden- Württemberg.

The sewage plant is run by the Municipal Sewage Utility Enterprise (SES), which is also responsible for the 1,741 kilometres of sewers which carry 100 million

Main sewage plant in Mühlhausen

cubic metres of sewage around the municipality every year, 70 rainwater overflow tanks, 51 rain storage reservoirs and 54 sewage pumping stations.

The SES invests around 40 million Euros in the maintenance and construction of sewers, rain storage reservoirs and sewage plants every year. Charges collected amount to around 60 million Euros a year. Since 2007, a distinction has been made between precipitation water charges and effluent charges. With a price per cubic metre of 1.29 Euros for effluent and 0.65 Euros for precipitation water, Stuttgart's charges are among the ten lowest in Germany.

Heat from effluent

The energy used in the Leuze mineral bath is recovered from the waste water from the 34°C pool. This is done by first guiding the waste water past a heat exchanger and then using the energy to heat the shower water using a heat pump. An extension to the system is in the planning stage, which will allow preheating of the pool intake and utilization of energy extracted from the shower waste water. The scheduled refurbishment and modernization of the Berg mineral bath due to be undertaken in the medium term will also consider deploying this technology.

Alongside in-house energy recovery, the possibility of recovering energy from public sewers is also an option. This technology is being studied for use in the Clinical Centre Stuttgart. If these measures are implemented, it will be possible to save 1,054 tons of CO_2 every year.

Fun and games in the Leuze children's pool

Waste management

In the State Capital, 60 per cent of waste is recycled and 40 per cent used to generate energy, saving an annual 30,000 tons of CO_2.

According to the waste balance drawn up by the Baden-Württemberg Ministry of the Environment, waste from households was reduced from its 2.62 million ton level in 1990 to 1.54 million tons in 2007. During the same period, the incidence of recyclable materials and bio waste increased from around 800,000 tons to 2.2 million tons. Taking the incidence of waste and recyclable materials together, the overall quantity has risen slightly from 3.4 to 3.7 million tons. In contrast to 1990, today no unused landfill now remains, with 60 per cent being recycled and 40 per cent used to generate energy.

Residents in Stuttgart produced 420 kilograms of waste and recyclable materials per head in 2007. The generation of energy from waste converts into a CO_2 saving of around 30,000 tons. The savings brought about by recycling are impossible to quantify.

While rubbish collection fees rose up until the mid 1990s due to expenditure on improving the rubbish collection service system, these charges have since remained at the 1997 level. This positive development came about through cost savings made due to new conditions negotiated with the waste disposal contractors.

The main changes made in the field of waste management are due to the Closed Substance Cycle Waste Management and Waste Disposal Act, which has been in place since October 1996. This legislation stipulates that production and consumption must be managed to prevent waste from the outset, that unavoidable waste must be reutilized to the best possible degree and that unusable waste is destroyed, with clear precedence given to the prevention or reutilization of waste over its destruction. The underlying principle here is that whoever produces or processes goods bears product responsibility.

This encourages producers to design products for a long life and multiple use. In production, recyclable waste or secondary raw materials (such as scrap or processing wastes) should be used. Producers must accept the return delivery of used products and recycle them. Leading Stuttgart-based companies already manufacture products made from largely recycled materials which are characterized by the low use of resources, low energy requirement and good recycling properties.

Refuse incineration in Münster

Residual waste incineration plant Stuttgart-Münster

Our residual waste incineration plant is based on pioneering technology: It ensures the environmentally friendly destruction of waste, produces district heating for Stuttgart and reduces the use of fossil fuels (coal, gas, oil). Compared to the conventional generation of energy, power generated in the Münster power station from waste saves the environment almost 100,000 tons of CO_2 emissions every year.

Power was generated on the site of the present-day combined heat and power station as long ago as 1908. Just 60 years later, the first waste was incinerated on the site, although only half the current quantity. The power station comprises a hard coal-fired power plant with three coal boilers, a waste incineration plant with three refuse boilers and a gas turbine system. A total of 420,000 tons of waste are used to generate heat here every year. Of this, around one quarter comes from Stuttgart, the remainder from affiliated districts and one commercial user.

Stuttgart's Municipal Solid Waste Management Enterprise (AWS)

With a workforce of 740, the Stuttgart Municipal Solid Waste Management Enterprise (AWS) continues to steadily improve its services, which range from the transportation of recyclable materials to the operation of recycling depots, disposal of domestic and commercial waste, street cleaning and winter clearing and gritting services through to the operation of public lavatories. The AWS also operates a contaminant vehicle which regularly travels to 70 different locations to deal with problem substances.

Around 4,000 rubbish bins are emptied several times a week in Stuttgart. 50 unusual bins in the main shopping street Königstraße may not look any different to normal bins at first glance. In fact these are underground waste collection points which are hollow and which extend underneath the street level. Their capacity is easily ten times that of a normal bin (around 650 litres). The way in which they are emptied is also unusual: The collected waste is simply suctioned up at lightening speed by a hose.

We all want clean streets and pathways. Where no cars park, the AWS uses conventional sweeping machines. But where cleaning is less simple, a specially developed extended vacuum arm is used. The five trucks are regularly on the streets of Stuttgart from Monday to Friday keeping our city clean.

Today, the AWS runs four recycling depots in the city districts of Hedelfingen, Münster, Plieningen and Weilimdorf. Two of the depots are already certified in line with the regulations of a specialist disposal company. Alongside bulk waste items, combustible building waste and electronic scrap, recyclable materials such as metal and paper are accepted free of charge in normal household quantities. In 2007, around 5,000 tons of bulk waste items and recyclable materials as well as 700 tons of electronic scrap were delivered to the sites. On average, 120 deliveries are received every day by each of the depots. Plans exist to establish additional recycling depots.

Emptying underground waste bins in the Königstraße

For the disposal of bulk waste items, since 2006 the AWS has offered an express service. Residents can have their old furniture, sinks or dishwashers collected during the week within 48 hours notice. A call or internet registration is sufficient. On the city's website, Stuttgart residents are also offered the opportunity to give away items, or for example to look for free items such as free packing cases: www.stuttgart.de/verschenkmarkt.

The recycling depots accept delivery of materials such as glass free of charge

Public relations and civic commitment

Information and advice

On any subject ranging from energy saving to mobility and waste prevention, the City of Stuttgart provides advice to residents on central environmental issues.

The Stuttgart Energy Advice Centre (EBZ) set up by the Environmental Protection Office is available as a central point of contact for home owners, tenants, tradesmen or architects. This not-for-profit organization has been working in partnership with the city administration and private organizations since 1999 to provide qualified, affordable advice. The range of services on offer include informative events, energy diagnostics and what is called the "Stuttgart Standard", a service ranging from free initial advice through to monitoring the building execution of all phases of a renovation project as required by law. The specialists from the EBZ check whether roof insulation is airtight, and windows are flawlessly mounted in the facade without creating thermal bridges. The EBZ also opens the door for its customers to a variety of funding schemes.

The environmental advisory service provided by the Office of Environmental Protection provides residents with information on how to save energy and which measures are eligible for subsidy by city, state or national schemes. The service answered over 600 enquiries on these subjects in 2007. Alongside telephone and face to face information, the environmental advisory service also organizes campaign days and competitions. In 2007, for example, bags of free wild flower seeds were distributed and advice provided on near-to-nature balcony planting.

The advisory team also hold talks, provide workshops for associations and institutions and put together environmental tips for media publication. Anyone interested may borrow ammeters or a test case containing energy-saving bulbs free of charge.

The mobility advice team within the Office of Environmental Protection has been providing free advice on environmentally friendly transport for ten years. The "m-punkt" mobility advice service in the Tourist Information Centre will help residents and tourists plan routes – whether by bike, rail, car or on foot. Staff will also provide tips on fuel-saving methods, which show how easy it is to cut down on fuel consumption and save up to 300 Euros a year without compromising on travel time.

The mobility advice service is experiencing growing demand. Over recent years, the number of enquiries has more than doubled compared to the initial years. In total, around 540,000 enquiries have been answered.

Implementation of the recommended actions has helped to save around 7,800 tons of CO_2 every year.

The work of the mobility advice service receives the invaluable support of the EU project CIVITAS, which is designed to promote environmentally friendly mobility in cities. Alongside Stuttgart, Genoa, Krakow and Burgos are also participating in the scheme. Genoa, for instance, set up its mobility advice service on the basis of the Stuttgart model.

The "Stuttgart Commuter Network" is a part of the mobility advice service and helps create car sharing groups online: No matter whether for the daily commute into Stuttgart or to a one-off national football match. And incidentally, holders of a combined ticket may use the local public transport free of charge. The portal, set up within the framework of the EU project CIVITAS, is among the best and most frequently used services of its kind anywhere in Europe, with over one million hits registered to the site since 2006.

John Döveling, staff member of the Parks, Cemeteries and Forestry Office, advises a caller on the "Green Telephone" hotline

A "Green Telephone" hotline service set up by the Parks, Cemeteries and Forestry Office is available to answer gardening-related questions, and a service also exists for businesses, offices, public institutions and building firms to ring for advice on subjects such as prevention, recycling and disposal of waste. This customer service answers between 400 and 600 enquiries a day. In addition, AWS offers a wide range of information and services in the Internet. By clicking on to www.stuttgart.de\abfall, every household in the Stuttgart area can directly request the collection of bulk waste items and green waste as well as express bulk waste collection twice a year. An individual waste collection schedule can also be printed out in the form of a monthly calendar. As well as a range of handy tips, users can also find out the business hours of the recycling depots.

Motivating residents and businesses

Many of the climate and environmental protection campaigns run by the City of Stuttgart are aimed at motivating residents to action and encouraging awareness.

"Stuttgart takes a deep breath"

In a bid to beat the problem of particulate pollution, alongside a range of municipal measures (such as converting all buses used for local public transport for the use of low-emission exhaust systems or optimizing the traffic flow), Stuttgart relies on the cooperation of the general public.

The "Stuttgart takes a deep breath" campaign is designed to increase awareness among the population and also motivate individuals into action. Banners and posters draw attention to the issues and refer to the website providing comprehensive information about how particulate is created and its possible health repercussions. The site also contains useful tips on how to avoid particulate.

Since 2006, the use of buses and trains has been made more attractive by the issue of an "environmental off-peak monthly pass" which allows users to travel for one month at rates starting from 1.25 Euro a day on weekdays after 9.00 a.m. and any time at weekends and public holidays.

Energy saving bulbs

Buy one, get one free – this was the slogan of an incentive campaign entitled "Energy-saving bulbs for Stuttgart". Anyone buying an energy-saving bulb between October 2003 and December 2004 was given another 15 watt energy-saving bulb for free. The 59

This campaign distributed around 7,500 energy-saving bulbs in Stuttgart

electrical retail stores and dealers taking part in the campaign distributed almost 7,500 bulbs. In total this correlates to a saving of around eight million kilowatt hours and over 4,000 tons of carbon emissions.

Eco-Fit Program

A environmental advisory campaign staged by the Environmental Advice Service in 2007 and 2008 entitled the Eco-Fit Program was taken up by 22 Stuttgart-based businesses, craftsmen's enterprises, social institutions and a clinical centre. Working with external consultants as part of this eco management program, businesses and public entities found out about ways in which they could save energy. The participants are now collectively saving 3.4 million kilowatt hours of electricity and 25,000 cubic metres of water a year – making up over 450,000 Euros a year in energy costs. They are also relieving the environment of 2,600 tons of CO_2 and 190 tons of waste.

Environment Award

Since 1984, the State Capital has invited contestants to compete for an Environment Award in the categories waste, water, energy, mobility, nature conservation and environmental management. This drive is aimed at associations, groups, businesses and individuals. Contestants can compete for money prizes totalling 5,000 Euros. Outstanding projects receive a special award. Stuttgart's schools have been among the most avid

This photo submitted to the "Wildlife in the City" photographic contest proves that a stork feels clearly at home in Stuttgart

contestants over recent years. Projects have included care of the school gardens by students or finding ways to cut down radically on the quantity of refuse.

The Hegel-Gymnasium was the first school of general education in the State Capital to be certified in accordance with the EU Eco Audit Ordinance in 2007.

The school's achievements included, for instance, reducing its heating energy requirement by around 25 per cent – partially as a result of measures costing no money. The action group also developed a transferable management structure which ensured that most work was carried out during the regular teaching timetable, with coordinated distribution of tasks among the greatest possible number of subjects and class levels.

Photographic contest

A photographic contest held by the Environmental Protection office helps to bring environmental issues in every-day city life sharply into focus. The theme for 2007 was "Wildlife in the City". The best photos showed a stork perched on a street lamp, a fox in the inner city and hares next to the tramlines. The prize-winning entrants were exhibited in the City Hall. The photographic and the Environment Award contests are staged on alternate years..

A private garden pond as a biotope for plant and wildlife

"Naturally Stuttgart"

Around 800 Stuttgart residents compete every year to see who has the "greenest fingers" as part of the "Naturally Stuttgart" contest. The prize is presented to the winner by the Mayor in person. This contest was staged for the first time in 1905, aimed exclusively at ornamental flower displays. In 1991, the contest acknowledged the growing environmental awareness by including the aspect of "Nature in the city" and adding a category entitled "Landscaping in touch with nature". Since 2002, both contests have been staged under the heading "Naturally Stuttgart".

"Let's clean up Stuttgart"

The Association Friends for a Safe and Clean Stuttgart, the Municipal Solid Waste Management Enterprise and the Parks, Cemeteries and Forestry Office have been staging the "Let's clean up Stuttgart" campaign for the past ten years. This successful idea born in Stuttgart has since been taken up by other cities such as Düsseldorf, Hamburg and Munich.

Even the youngest members of the community get involved in "Let's clean up Stuttgart"

"Let's clean up Stuttgart" is a contest between the city's districts. Participants are children from nurseries, schools or simply groups of friends who clear rubbish from woods, streams or meadows every year. The winners are awarded a prize of 5,000 Euro.

The aim of this campaign is to raise awareness among residents of how they can personally have an impact on their environment. The fun to be actively working together is another important aspect. The district offices appeal to institutes and groups represented in the district – primarily clubs, schools and nurseries – to launch their own clear-up drive between March and October. To date, they have succeeded in encouraging around 20,000 people join in the "Let's clean up Stuttgart" campaign. Many of these have gained a sense of responsibility for their district beyond the confines of the contest. Their commitment is demonstrated by the appointment of voluntary caretakers, 80 taking care of playgrounds, 110 for green spaces and around 60 for dog waste bag dispensers.

Residents lend a helping hand

The City attaches enormous importance to civic involvement: Stuttgart residents help by greening their roofs, cultivating trees, cleaning up waterways…

More than 300,000 square metres of Stuttgart's roofs are currently greened. Joined together, this makes up an area as big as the Wilhelma gardens. Since 1986, the City of Stuttgart has provided financial support to green some 60,000 square metres of roof area. The result is not only pleasant to look at, it also makes a contribution to climate protection.

The plants produce oxygen, help bind dust, absorb rainwater and cool the air. The same applies to greened walls. A green wall just under 40 square metres in size is as much benefit to the environment as a tree with a crown measuring five metres in diameter. Particularly in densely developed urban centres where space for trees, shrubs and lawns is restricted, greened facades offer an ideal option. Between 1984 and 2002, thanks to the "Plant a Tree in Stuttgart" Association, 500 trees have been planted, including some rare species such as foxglove trees (Paulownia), locust trees (Gleditsia) or a giant sequoia (Wellingtonia). The Parks, Cemeteries and Forestry Office continues to cultivate the trees and their locations to this day.

Since 1992, a scheme has been in place for Stuttgart residents to adopt a tree. Today some 182 caretakers have adopted almost 500 trees, reporting pest attack in the roots, trunk or crown area, keeping the tree reliably watered and the tree bed scarified, informing dog owners politely that their dog's calling card can damage trees, and removing debris.

Greened roofs and walls improve the city's climate

Many trees have been adopted by willing caretakers

The Max-Eyth lake is a popular destination for day trippers in Stuttgart. On hot summer days, for some time the lake has been on the verge of ecological collapse. The Mühlhausen Youth Council and cabaret artist Christoph Sonntag have been investing enormous energy to try and save this valuable resource.

Since the summer of 2008, fresh water has been introduced to the lake over a new pipeline. 132 tons of sand, ten tons of stones and gravel have turned parts of the peninsula into a city beach. As a special surprise, 10,000 shells and 8,000 semi-precious stones spread in the sand could be taken home by visitors as souvenirs. At the same time as providing an additional overland water supply, plans exist to create a water park as an outdoor "classroom" to teach biology to school children at first hand.

Although the action group was primarily concerned to nurse the lake back to health, the possibility that certain parts of the lake will be reopened for bathing at some time in the future has not been excluded, although naturally only with the proviso of strict protection for flora and fauna.

Max-Eyth Lake

Research projects

Municipal research projects

Stuttgart was and still is involved in a large number of energy-related research projects:
MOSES (model refurbishment of a school) to reduce heat consumption in Plieningen Primary and Basic Secondary School by 75 per cent

KORIAS (reduction of carbon dioxide in the Sonnenberg Old People's Centre) – refurbishment of an old people's care home to reduce energy consumption by 70 per cent.

BRITA in PuBs (Bringing Retrofit Innovation to Application in Public Buildings) – EU project with 23 partners to reduce primary energy consumption in an old people's care home by 50 per cent and cover 20 per cent of the residual energy requirement using renewables.

Fuel cells – 1. Operation of a fuel cell in the Möhringen sewage plant to increase self sufficiency to 80 per cent. 2. CUTE (Clean Urban Transport for Europe) – operation of three buses belonging to Stuttgarter Straßenbahnen AG with fuel cells until 2006.

Living in the Veielbrunnen district – low energy as a location factor – supply of a new urban district with locally sourced energy.

Best Practice Implementation of Solar Thermal Obligations (ProSTO) – Development of an ordinance on the installation of thermal solar systems.

Research project EnerKey Johannesburg. Development of megacities with "energy as a key element". Individual projects to enhance energy efficiency in schools, public buildings and transport in the region of Gauteng (South Africa) and in Stuttgart.

AMICA (Adaptation and Mitigation – an Integrated Climate Policy Approach) – EU project for the development of strategies to adjust to climate change while reducing greenhouse gas emissions.

Research projects in the field of inherited contamination:
INCORE (Integral Groundwater Remediation) – Europe-wide cross-location analysis of complex soil and ground water contamination in industrial areas, in the centre and east of Stuttgart.

OLES (Oel-Epple Stuttgart) – Decontamination of polluted ground water on the former Öl-Epple industrial site in Bad Canstatt.

REVIT (Towards more Effective and Sustainable Brownfield Revitalization Policies) – Rendering former brownfield sites usable in the area of the former freight depot in Bad Cannstatt.

MAGIC (Management of Groundwater in Industrially Contaminated Areas).

“Triple Zero” in the metropolitan region of Stuttgart

Zero emission, zero energy, zero waste of resources

The metropolitan region of Stuttgart, Europe’s leading high-tech region, comprises the Stuttgart region, the regional centres of Heilbronn, Tübingen/Reutlingen, the district centres of Schwäbisch Gmünd and parts of the Northern Black Forest Region. It has set itself the goal of developing and implementing an ambitious climate, energy and resource saving program.

As its lighthouse project, this program aims to set standards in the fields of engineering, architecture and urban planning. Its most ambitious aim is the achievement of the “triple zero” building: Zero emission, zero energy, zero waste of resources. In future, the objective is to construct buildings which pollute neither the air nor the soil, and which require no fossil energy. In addition, the construction process must aim to utilize reusable materials and to occupy no greenfield sites, and to provide buildings which produce their own electricity and heat. “Triple zero” sees its role as that of a “learning project”, meaning that a research team and the board of trustees join forces with the German Association for Sustainable Building to consistently progress the project, while exchanging experiences with other European cities. The planners are looking first at the development of concepts for public buildings such as kindergartens, old people’s homes, schools and gymnasiums.

The Uhland school building is something of a flagship for the project. As a Plus Energy school, it is the first anywhere in Germany to generate more energy than it uses, saving an annual 216 tons of CO_2. To improve funding for the pilot project, Stuttgart is applying for grants on the EU and national levels. Stuttgart’s Mayor is assuming that it will be possible to realize 25 projects over the next five years.

Stuttgart-based architect Professor Werner Sobek put this project into practice as long ago as the end of the 1990s with what he himself termed “ecology made breathtakingly beautiful” in the form of a futuristic-looking energy saving home. “R128” – as the house was called in allusion to its address – features a totally glazed outer envelope, while the inside comprises a flexible floor plan or rather an open room layout.

Sobek firmly believes this to be the building technology for the third millennium. His house combines “total transparency (…) with a breathtaking feeling of wellbeing”. It also produces no emissions, is energy neutral and one hundred per cent recyclable: “Parts of ‘R128’ could be used tomorrow to make an engine hood for a Porsche”.

Energy saving house 'R128'

A computer control system, voice control and sensor technology govern the flow of energy, the lighting and room climate. Compact in terms of its functionality, 'R128' also turns out to be an absolute lightweight, with a construction weighing just 40 tons. A conventional detached house of this size weighs at least five times as much.

An endeavour will also be made to achieve the "triple zero" criteria in the residential complex at Killesberg, in the Pragsattel area and on the site of the former freight depot in Bad Canstatt. A visionary role is also ascribed to the envisaged model eco district "CITY PRAG" – a nine hectare site at the northern entrance to the city. An 18-storey office tower and office building are set to be erected here at a cost of 45 million Euro which will feature a practically CO_2 free energy supply. A wind rotor is planned to be installed on the roof, photovoltaic shutters on the facade and climate pipes in the concrete ceilings. 70 per cent of the heating requirement will be met by geothermal technology. This will save the tenants ancillary costs, as the building will be climate controlled without the use of costly fossil fuels.

Networks for exchange of experience and good practice

Stuttgart passes on successful ideas and gains valuable impetus through international networks.

Stuttgart is keen to find out about successful projects implemented in other cities and to work with them to establish pioneering strategies in the national, European and worldwide context. To achieve this end, Stuttgart is involved in national and international networks.

The diversity of the people of Stuttgart is mirrored by the diversity of its privately organized and civic networks. Alongside political, cultural, economic and honorary activities, the city is particularly involved with the issues of environmental and climate protection through a number of successful networks:

For the last 20 years, Stuttgart has been a member of the Energy Saving Committee of the German Association of Cities, which publishes "Information on Municipal Energy Management". For over 10 years, Stuttgart has been active in the Municipal Energy Management Forum in Baden-Württemberg, an exchange forum for energy managers.

The first European Conference of Municipal Energy Managers met in July 2004 in Stuttgart. The aim is to turn this conference into a firmly established event on the EU level. 170 municipal energy managers from 22 European countries came to find out about projects undertaken in Stuttgart. The 2004 conference provided the initial impetus for the European Energy Network of the Council of European Municipalities and Regions. The network meets twice a year to exchange experiences, and disseminate the latest findings resulting from successful energy management projects. Stuttgart joined the Climate Alliance of European Cities (with a membership of some 1,500 cities) in 1995. The State Capital plays an active role in a working group on CO_2 monitoring.

Since 2007, Stuttgart has been a member of the " Energie-Cités" organization, whose member cities work towards the achievement of sustainable local energy policy: Optimum use of energy, promotion of renewable energies and protection of the urban environment. The organization numbers 110 members who work together with over 3,000 cities across the EU. This city network allows an exchange of experience at the local government level in the field of energy. "Energie-Cités" falls within the auspices of the European Commission, to which all the action plans are submitted.

In 2009 Stuttgart became founding member of the Covenant of Mayors to fight climate change in Europe by well defined local action plans.

In 2002, Stuttgart founded the Centre for Energy Research (ZfES). This specialist network is a cooperation between the City, the University of Stuttgart, and industry. The ZfES offers those involved a platform for cooperation on topical energy supply-related issues, and provides support on the road towards achieving a sustainable supply of energy. Research projects focus on decentral energy supply, utilization of biomass, smart buildings, low-emission fossil fuel power stations, and on simulation, optimization and status-oriented maintenance in the field of power engineering.

The worldwide network "Cities for Mobility"

The worldwide network "Cites for Mobility" was launched in 2000 as the project "Urb-Al" under the auspices of the European Union. Within this city network, Stuttgart undertook the role of coordinating the topic "Control of urban mobility". Once this fixed-term project was complete, Stuttgart became more actively involved in the issue, taking "Urb-Al" as the basis for the formation of "Cities for Mobility", a global network concerned with urban transport issues. Around 460 cities from 62 countries are involved (including Rio de Janeiro, Mexico City, Utrecht, Madrid and Graz). Under Stuttgart's lead, "Cities for Mobility" promotes transnational cooperation between local governments, transport operators, industry, science and civil society. Its aim is to develop sustainable, efficient and future-proof transport systems in the member cities with a view to achieving environmentally and socially equitable mobil-

The University of Stuttgart is partner to the specialist "ZfES" network

Among the landmark successes achieved by Stuttgart's environmental policy:

- The Stuttgart climate protection concept "KLIKS" has set a guideline for the city's activities since 1997.
- In 2005, CO_2 emissions in Stuttgart had fallen by around six per cent compared to 1990. This is equivalent to around 216,000 tons a year.
- CO_2 emissions from municipal properties dropped between 1990 and 2006 by almost 20,000 tons per year. This corresponds to nine per cent compared to 1990.
- Since the introduction of Municipal Energy Management in 1977, consumption has been reduced by a total of 5.6 million megawatt hours of heating energy and 0.5 megawatt hours of electricity, saving a total of 330 million Euros.
- Sulphur dioxide emissions have been reduced in Stuttgart from 3,350 tons in 1990 to just around 900 tons today. Nitrogen oxide emissions dropped from 11,400 tons in 1990 to around 7,000 tons. Sulphur dioxide pollution in the air has dropped to one eighth during this period.
- 60 hectares of greenfield land earmarked for development has been cut from the 2010 land development plan.
- 39 per cent of Stuttgart's surface area has been listed as protected green belt land or nature conservation areas.
- The cityscape is characterized by 5,000 hectares of forests and woodland, 65,000 trees in parks and open spaces and 35,000 trees planted on roadsides.
- 300,000 square metres of rooftops have been greened in the city.
- 32 kilometres out of 245 kilometres of tram tracks have been grassed (as of 2007).
- Since 1994, studies of flowing waterways have indicated an improvement of quality by one or two quality categories. The number of fish species inhabiting the Neckar has increased from 23 to 41.
- Per capita drinking water consumption is around 122 litres a day, and is currently dropping by 0.5 to one percent every year.
- Waste management in Stuttgart saves an annual 95,000 tons of CO_2.
- The annual incidence of domestic and bulk refuse in Stuttgart dropped between 1990 and 2007 from 283 kilograms to 232 kilograms.

Perspectives

The following will remain as key future objectives for environmental protection:

1. Expansion of the Energy Advisory Centre

The Energy Advisory Centre (EBZ) has now become an established port of call for all those seeking competent, impartial information on the subject of renovation of existing building stock. The aim here is to ensure adequate funding.

2. Continuation of the existing building modernization program

This program encourages energy efficient renovation projects. Subsidies are available subject to submission of an energy diagnosis for the complete building. The aim in this instance is to continue the success of the program to date.

3. Application of the Urban Energy Saving Ordinance for private investors

Municipally owned land will only be sold to investors prepared to construct highly energy saving building designs. The aim here is to apply the Urban Energy Saving Ordinance to as many projects as possible and to provide advice for investors as early as the planning stage of their ecological building projects.

4. Expansion of Municipal Energy Management

Over 25 years ago, the city launched a systematic energy management program. The aim here is to ensure that the around city's own around 2,000 properties are operated as economically as possible.

5. Energy efficient renovation of schools

Another focus of the climate protection program is the renovation of old heating systems in city buildings, in particular in schools. The aim here is to refurbish all schools over coming years, including the building envelope and engineering installations.

6. Further promotion of projects involving renewable energies

Solar systems (for heating bathing water) for have now become an established standard feature in the city's swimming pools. Wood chip fired heating systems are in operation, two sewage plants supply electrical current made from sewage gas, and the city operates its own photovoltaic systems. The aim is for additional projects involving renewable energies to be supported, for example by providing municipal rooftop space for solar systems, in particular in schools, to investors free of charge.

7. Promotion of energy-saving, environmentally friendly mobility

Stuttgart is working to facilitate the use of local public transport networks, is extending the local and long-

distance transport infrastructure, supports car sharing schemes, is working on the development of urban district transport management, is reducing emissions and energy consumption for private traffic and also promotes cycling. The aim here is to expand existing measures designed to promote energy-saving mobility.

8. Urban development with effective climate protection

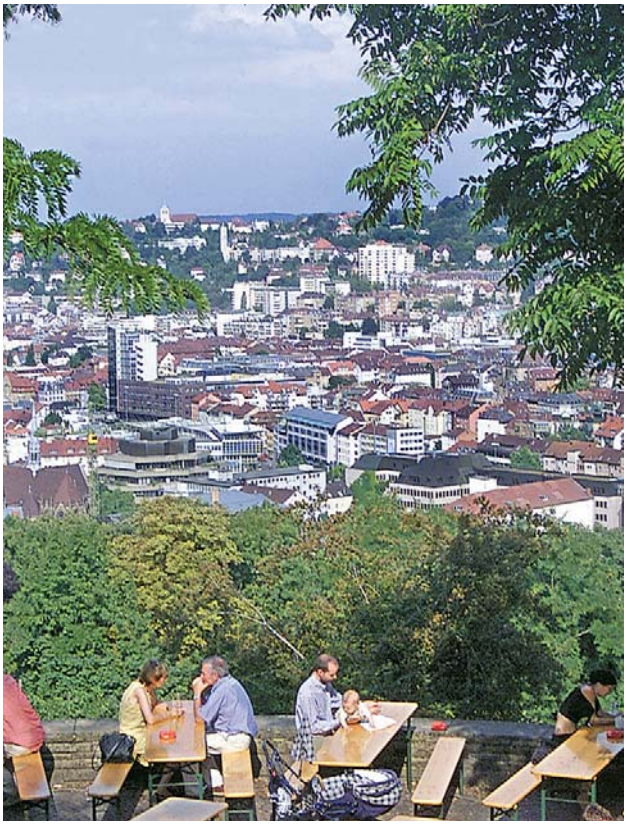
Stuttgart has more green belt and nature conservation areas than any other German metropolis. The land use plan 2010 envisages urban development under the premise “urban – compact – green”. Out of a sense of responsibility towards the environment, building land will remain a scarce resource in Stuttgart. The aim is to make further considerable reductions to land use.

9. Water and soil conservation

Stuttgart is also committed to the future protection of local ground water supplies and to preserve the natural purity of its mineral water. It is involved in the renaturization of streams and the development of rainwater treatment plants in the sewer network. Its main emphasis in the field of soil conservation lies in the recovery of contaminated sites, maintaining close-to-nature green spaces and promoting decentral stormwater infiltration.

10. Encouraging exchange of best practice

The City has been involved in German and European networks, for instance as a member of the Energy Saving Committee of the German Association of Cities for the past 20 years. On the initiative of Professor Voss, in 2001 Stuttgart also founded the "Stuttgart Centre for Energy Research” (ZfES), an association of university institutes and non-university bodies. The aim is to learn from each other through the formation of networks.



View from the Karlshöhe hill

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