

GREEN CITY FREIBURG



APPROACHES TO SUSTAINABILITY

GREENCITY FREIBURG

Welcome

Efficient climate protection and environmental policy is founded on many pillars: an energy policy based on renewable energy sources such as solar, wind and hydro-power, or biomass – an attractive range of bus and rail services, heat insulation programs and low-energy and zero-energy standards for domestic housing being just a few examples.

The 'Green City' label represents a combination of many ideas, each of which complement each other to form a consistent, unified municipal environmental and climate protection policy. In a Green City, science and industry work hand in hand to achieve technical innovations, quality growth and strong, long-term employment. Management of the environment has long been a key factor in the economy.

In Freiburg, this policy is supported by the citizens. Their commitment to climate, water and soil protection underpins the sustainability of the city's urban development.

As a Green City, Freiburg has become a model and example for cities and communities across the globe. This recognition honors and also motivates us to develop new ideas and work towards the achievement of our goals.

Freiburg not only ranks high in Germany with regard to the utilization and funding of alternative energy sources and the expansion of local public transport and bicycle infrastructure. The city is also a front runner in job creation, economic growth and the number of overnight stays, which in 2010 was just under 1.3 million.

Focusing early on environmental sustainability, photo-voltaics and biotechnologies has given the city a decisive edge in an international competitive environment. Today, about 12,000 people are employed in the environmental and solar industries alone. Freiburg is the host city and organizer of numerous international industrial trade fairs and conferences, especially Intersolar, held in Munich, San Francisco, Beijing and Mumbai, Local Renewables, the Solar Summits and the Gebäude – Energie – Technik (GETEC) / Buildings – Energy – Technology fair.

Apart from science and technology, municipal policy and responsible citizenship, factors such as culture, climate, landscape coupled with lifestyle and quality of life, complete the profile of the Green City and make it a magnet for creative minds, investors and tourists from all over the world. In Freiburg, sustainability and a vibrant economy, future viability, scientific excellence and a life-affirming attitude all point towards the same goal.



Dr. Dieter Salomon
Mayor of the
City of Freiburg



Dr. Bernd Dallmann
Chief Executive
Freiburg Wirtschaft Touristik und Messe GmbH & Co. KG



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Going for GREEN

Climate protection and environmental policy in Freiburg

Freiburg can with some justice call itself one of the birth places of the environmental protection movement. The successful campaign against the proposed nuclear power station in nearby Whyll over thirty years ago became one of the founding legends of the Green Alternative Movement. This turned Freiburg into a rallying point for students, anti-nuclear activists and advocates of a new social order who together forged a colorful alliance with those citizens of Freiburg who espoused conservation values and ethics. The legacy of this is the social climate and municipal policy of the Freiburg of today. Initially, there were only individual visionaries and excentrics, small groups and associations searching for alternatives to atomic energy.

However, as early as 1986, the year of the Chernobyl disaster, the city council publicly advocated the abolition atomic energy and solar power as the new principal source of energy. This was also the year in which Freiburg became one of the first cities in Germany to establish an Environmental Protection Office.

Freiburg is one of the greenest cities in Germany, but not just because of its policies and politics. No other city of comparable size has more woodland and vineyards and such a diversity of landscapes, which range from the wild eminences of the Black Forest down to the alluvial woodland by the River Rhine. Given its rural setting and civic style, Freiburg unites all the positive connotations of green – a not inconsiderable factor in its appeal. Even in the 19th century, visitors to Freiburg were captivated by a sense of being “on the high road to Italy” and experiencing the “first sensations of the south” – all thanks to the Baden region’s mild, sun-kissed climate, the relaxed way of life of the city’s residents and not least to the delights of the local cuisine and cellarage.

Prizes and awards

In 1992, Freiburg was chosen as Germany’s **Environment Capital** for its pioneering achievements such as the installation of an early warning system for smog and ozone pollution, pesticide bans, and returnable packaging measures, for its traffic and transport policy and perhaps even for its engaging feel-good image. Almost every year since then, even more innovations in the field of environmental protection and solar engineering have been produced which, in turn, have been honored with yet more awards - the European Public Transport Award, the German Solar Prize, federal prizes for sustainability in urban development and top place in the ‘Sustainable Community’ competition organized by Deutsche Umwelthilfe (German Environmental Aid Association).

In 2010, Freiburg was named **Federal Capital for Climate Protection**. The city had fought off 72 other municipalities to win the eponymous competition and was honored for its comprehensive CO₂ reduction strategy. In the same year, Freiburg was crowned **The European City of the Year**. The British Academy of Urbanism conferred this prestigious award for exemplary town planning and design. Indeed, four Freiburg citizens have so far received the renowned German Environment Award: Georg Salvamoser, founder of Solar-Fabrik, the environmental and hygiene physician Franz Daschner, Joachim Luther, Director of the Fraunhofer Institute for Solar Energy Systems (ISE), and Rainer Grießhammer, co-Chief Executive of the Eco Institute. The Freiburg architect Rolf Disch was honored with the European Environment Award for this solar-architectural concepts and projects.

Claim and challenge

Freiburg should not, nor does it want to, rest on its laurels, content with being a charming, engaging “feel good city” where the local second-division football club attracts more attention for the solar panels installed on its stadium roof than for goals and wins. Today, the city is also seen as a model combination of “soft” ecology and “hard” economy. Environment policy, solar engineering, sustainability and climate protection concepts have become the mainstays of economic, political and urban development. And more important than the awards and backslapping from around the world is the fact that Freiburg’s citizens do in fact identify to a major degree with the city’s policies.

Sustainable ECONOMY

Green markets: Environmental industry and research

The Club of Rome is not alone in prophesying, "The markets of the future are green". The renewable energy sector delivers the engineering and expertise needed for a speedy abandonment of atomic energy and the associated switch to other energy sources. In the next ten years in Germany alone, the sector will invest a total of 235 billion Euro in systems for the generation of electricity, heat and fuels from renewable energies.

Environment as an economic factor

In Freiburg, environment management and science play a disproportionately large role in addition to medicine and biotechnology. With nearly 12,000 employees (i.e. almost 3% of all people in employment), in 2,000 business entities, this sector injects some 650 million Euro into the value-added chain, adding much to the positive image of the region. In the solar sector alone, the level of employment (currently over 2,000 and approx. 100 business entities) is three to four times the national average, according to a 2009 potential study.

Centers of private and state research studying renewable energies, such as the Fraunhofer Institute for Solar Energy Systems, act as centers of gravity surrounded by hundreds of spin-off companies, service providers and organizations. The following are examples of the diversity among them - Solar-Fabrik, the Regio Freiburg Energy Agency, consultancies and solar architects, a zero-emission hotel and the Future Workshop run by the Chamber of Skilled Crafts. Also farmers, foresters, organic vintners and growers benefit from the scientific work performed by such bodies as the Viticulture Institute, the

Forestry Experimentation and Research Institute or the research work on climatology, sustainable forestry and environmental medicine conducted at the Albert Ludwig University.

In the field of environmental education alone, 700 new jobs have been created, including a university chair of environmental economics. Under the auspices of the Solar University, which since 2007 has enjoyed the status of Elite University, an interdisciplinary Center for Renewable Energies (CEE) and the international Renewable Energy Management (M.Sc.) master's degree course have been established. The new demonstration center, i.e. the Green Therm Cool Center of the Chamber of Skilled Crafts and its partners in industry and elsewhere in the region deliver innovative and modern technologies supporting both the theory and practice of an up-and-coming field, solar thermal cooling.

Industry sectors such as classic plant and machinery construction are also benefiting from the continued upsurge in the solar economy – as is shown by three such companies: W+S, machine builder for solar module manufacturers, THIEME, a manufacturer of screen printing machines for the precision printing of silicon wafers or Somont, the subsidiary set up jointly by W+S and Knoll Feinmechanik, to produce string soldering machines. The above is also true for electrotechnology. In the manufacture of solar and thin-film cells, plasma processes make it possible to apply and remove material layers only nanometers thick. HÜTTINGER Elektronik generators deliver the necessary performance power for the manufacturing process.

Germany's first energy self-sustaining solar building



The Fraunhofer Institute for Solar Energy Systems



www.greencity-cluster.de
www.ise.fraunhofer.de
www.solar-fabrik.com
www.energieagentur-regio-freiburg.de
www.hwk-freiburg.de
www.green-therm-cool-center.de
www.wbi-freiburg.de
www.fva-bw.de
www.uni-freiburg.de
www.zee-uni-freiburg.de
www.solar.uni-freiburg.de
www.somont.com
www.rena.com
www.huettinger-electronics.com



The Heliotrope – a rotating solar ‘tree-house’ which follows the movement of the sun



The Solar Factory

Sun as an Economic Factor Solar Competence

As a result, more and more new value-added chains have been and continue to be created, ranging from basic research to technology transfer and worldwide marketing. The environment and the economy are not antagonists here. On the contrary, the environmental industry is the leading business sector in both town and region.

Cluster | GREENCITY FREIBURG

Under the cluster initiative, the FWTM, supported by the European Union and the state of Baden-Württemberg, creates cross-sector links between companies and institutions in the environmental and solar energy fields. Through its activities, the cluster acts as a platform for collaborations in the research and development of innovative products and assists in positioning the region's products and services in the markets of the future. Early in 2011, the network already had some 100 members, with more to come. The main areas of activity of the companies cover energy-efficient planning and construction, the utilization of solar energy and other renewable energies, environmental engineering and sustainable mobility. The portal www.greencity-cluster.de, which contains details of all the member companies and institutions in the region, acts as a central tool for this.

In terms of both economy and ecology, Freiburg has been most successful in the fields of research into and the marketing of renewable energies. A mere glance at the cityscape confirms this. Solar panels abound everywhere – on the Badenova Stadium and City Hall, on the roofs of schools, churches and private houses, on frontages and towers and, amazingly, even on the prison. Wind turbines rear up from the Black Forest hills. With more than 1,800 hours of sunshine per year and an annual radiation intensity of 1,117 kilowatts (kW) per square meter, Freiburg is one of the sunniest cities in Germany.

Favorable conditions

All this is not due solely to the city's favored location. This, combined with factors such as the high level of environmental awareness of the residents, the city's political priorities and a deliberate policy of stimulating the economy, are the principal reasons behind Freiburg's status as Solar Capital. Here, the opportunities offered by solar energy in terms of climate protection, the economy and urban development were recognized earlier than anywhere else. Freiburg's pioneering and model projects have been rewarded with prizes and high visitor numbers to such groundbreaking constructions as the world's first energy self-sustaining solar building, the Heliotrope, the solar village created by the solar architect Rolf Disch, or the zero-energy houses of the Vauban neighborhood – and the world's first football stadium with its own solar plant.

Solar power plant on the roof of the Badenova Stadium



Sustainable ECONOMY

The Freiburg mix

What makes Freiburg so special is its unique interplay, known as the 'Freiburg mix', of political, economic, geographical and historic attitudinal factors. Since 1986, the city has been supporting the expansion of solar energy by funding specific projects, using its own roof spaces and launching information campaigns – e.g. via one of the first solar registers on the internet. The local utility company, badenova, encourages the expansion of renewable energies with programs such as RegioStrom, Regio-Sonne, RegioWind and the innovation fund for water and climate protection.

Unparalleled network

The Freiburg solar industry and science network embraces such research institutions as the Fraunhofer Institute for Solar Energy Systems (ISE), which is Europe's largest solar research institute, the International Solar Energy Society (ISES), the international umbrella organization for solar institutions and international companies such as Solar-Fabrik AG, Soitec Solar GmbH, SolarMarkt AG and Solarstrom AG plus regional tradesman businesses, suppliers and service providers. The regional business association 100 Prozent GmbH is committed to the political objective of an energy supply solely from renewable energies, something which lies at the heart of sustainable economic development. Solar technology in Freiburg has so far created way over 2,000 jobs. The Intersolar has grown to become the key international exhibition for the solar technology industry.

www.badenova.de
www.freiburg.de/freesun
www.ises.org
www.ise.fraunhofer.de
www.solar-fabrik.com
www.solarmarkt.com
www.soitec.com
www.solarstromag.de



Manufacturing of modules at the Solar Factory

Solar competence and application center

Freiburg is a source of consultancy wisdom and basic and advanced training for interested parties from across the world. The Freiburg SolarRegion is a veritable hub of expertise, resources and infrastructure in the form of the region's science, schools, associations and environmental organizations – many of them under the roof the technology park's Solar Info Center. One of the most successful examples of an international knowledge transfer is the collaboration with Italian partners leading to the development of the Italian Solar Info Center in Padua. In 2009, to celebrate the 50th anniversary of town twinning with the French city of Besançon, a collaboration agreement on climate protection and the sustainable supply of energy was signed.



www.solar-info-center.de
www.100prozentgmbh.de
www.intersolar.de
www.freiburg.de/umwelt
www.solarregion.freiburg.de
www.solarregion.net
www.isicenter.it

Solar Info Center





Concentrated PV module manufactured by Soitec (Concentrix Solar Co.)

How to get out of the greenhouse: climate protection and sustainability

Climate protection needs international and national agreements and goals, but towns and regions can also act as pioneers and set examples for others to follow. Freiburg took climate protection seriously long before the issue was on the general political and economic agenda and, as a result, is nowadays considered as a role model far beyond Europe.

Climate protection concept 1997

In 1966, the city council resolved to cut by 25% Freiburg's CO₂ emissions by the year 2010. The successes achieved were remarkable. It introduced a package of measures which succeeded in making significant reductions, especially in the transport and energy sectors. Previously, nuclear powered electricity had provided 60% of the city's requirements – now it was cut to below 10%. Since January 2011, the regional utility company, badenova, has been supplying green electricity to private customers as standard. Over 50% of the city's electricity is generated by combined heat and power plants.

Continuation 2007

However, though the city did not achieve its original aim of 25% less greenhouse gas by 2010, it saw this as an incentive rather than grounds for mute acceptance. In the summer of 2007, following a climate protection report from Freiburg's Oeko-Institut, the city council decided to proceed with its climate protection concept and raise its sights even higher. Now there was to be 40% less CO₂ by the year 2030 - admittedly an ambitious goal, but not unrealistic, given improvements in recent years in the underlying national and international conditions for climate protection. The city is currently working with the Oeko-Institut on a strategy to achieve climate neutrality by the year 2050.

Targeted investments

A local climate protection policy worthy of the name cannot restrict itself to gestures and declarations of intent. It requires a genuine commitment to realistic, political and financial action. Since 2008, 10% (1.2 million Euro) of the concession dues paid to Freiburg by the regional utility company badenova AG has been invested in climate protection projects, especially in the transport and building sectors.

Solar facade of the residential complex at Wilmersdorfer Street



Sustainable ECONOMY

Motivation and cooperation

However, the climate protection program can only really be a success if the city reaches out beyond its role model function to get on board as many other players as possible – companies, utilities, private households, the University, media. Climate protection is an issue affecting everyone. Things left undone today will cost us dear tomorrow.

Campaigns and events

Targeted public awareness campaigns have been launched to mobilize the city's residents. The CO₂LIBRI and CO₂ Diet climate campaigns call on all Freiburg's residents to play their part in cutting CO₂ emissions. The successful series of events entitled 'Sustainability as the Art of Living' lives on in the project '200 Families Proactively Protecting the Climate'. For a whole year, Freiburg residents can experiment with creating greater quality of everyday life through climate protection, fitting them out to be ambassadors for sustainability.

www.CO2libri.freiburg.de
www.freiburg.de/co2



Gerda Stuchlik
Deputy Mayor, Department of the Environment, Schools, Education and Facility Management

Main focus of the city's climate protection policy

Our main focus continues to be energy savings, energy efficiency (through combined heat and power) and the use of renewables. Apart from making progress in these sectors, cooperation, especially with industry, commerce and trade, will be promoted. Since 2010, the City of Freiburg has been making the ECOfit program available to companies. This program entails training participating companies on environment management issues in workshops and on-the-spot teaching events.

The 'Energy Efficient Restoration' incentive program has proved its worth. This makes available an annual grant of 450,000 Euro for the restoration or renovation of old buildings.

The 'Energy Efficient City Master Plan' is a major factor in Freiburg's efforts to achieve its climate protection goals. A planning tool is being developed for the creation of efficient, decentralized energy supply solutions, such as combined heat and power. This master plan has three main planks: a heat register to collate basic data, a strategy aimed at expanding the use of combined heat and power and the utilization of it district by district.



Solar City Hall



Facade of the Solar Factory



Thermal waste treatment plant generating energy from non-recyclable waste, Industrial Park Breisgau

Waste not, want not: The waste management concept

“Z’ Fryburg in de Stadt / sufer isch’s un glatt“ – “In Freiburg’s city, it’s clean and pretty” is the couplet composed by poet Johann Peter Hebel over 200 years ago. These days, waste separation is practically a sport here, if not a way of life. The zeal displayed by Freiburg residents as they sort their rubbish into grey, green, yellow and brown bins is the stuff of legend. As a result the volume of non-recyclable rubbish per capita is markedly less than the state and national averages.

Returnable container principle and financial incentives

The city itself sets a good example by using paper of which approx. 80% has been recycled. Since 1991 waste avoidance is rewarded by a system of financial incentives: grants for using textile baby diapers, discounts for collective waste disposal schemes and for people who compost their green waste.

Treatment of non-recyclable waste

Since 2005, the region’s non-recyclable waste is incinerated in the Thermal Non-recyclable Waste Treatment and Energy Generation Plant in the Breisgau Industrial Park 20 km to the south of Freiburg. This plant, known by its German initials TREA, practices waste disposal safety by maintaining high environmental standards. It supplies electricity

to some 25,000 households. From mid 2011, heat from TREA will be decoupled in favor of a biomass center to be created nearby where horticultural green waste will be reconstituted as wood-like chippings for incineration in wood-fuelled heat and power stations. In the fermentation plant of Biogas- und Kompostbetrieb Freiburg (BKF) GmbH, organic waste is converted into compost and biogas. The energy generated from the fermentation of organic waste covers 2% of Freiburg’s electricity needs.

Waste management consultancy and training

The waste management concept of 2008 updates the strategy for the future calling it “avoidance before recycling before disposal”. Avoidance and waste separation point to the way out of the ‘throwaway’ society and into a climate of prudent, sustainable consumer behavior. Since as far back as 1994, Freiburg’s partially privatized waste disposal and urban sanitation company (Abfallwirtschaft und Stadtreinigung Freiburg GmbH - ASF) has, on behalf of the city, been working together with schools and the Freiburg Eco-Station to organize courses and guided tours, a ‘Theatre of Rubbish’ for elementary schoolchildren, competitions and teaching units such as ‘Waste Not, Want Not’ or ‘Children and Agenda 21’.

www.tbe-waerme.de
www.abfallwirtschaft-freiburg.de

Vehicle collecting hazardous substances



Fleet of modern vehicles



Centralised recycling station



Sustainable ECONOMY



Making international business contacts at the Intersolar

Future workshop Freiburg: Eco-industrial tourism, conferences and trade fairs

These days, image factors are important for the economic and tourist appeal of a city. Freiburg has gained an international reputation in such fields as solar engineering, traffic and transport policy, as well as environment and climate protection. Media people and delegations representing environmental politics, science and industry are travelling to Freiburg in increasing numbers to make contacts and learn about the model projects and concepts underpinning a sustainable form of urban development.



Group of Japanese visitors inspecting solar plants

The Indian Minister for Renewable Energies, Shri Vilas Muttemwar, stated during his visit to Intersolar, the solar energy exhibition, that India wanted to benefit from Freiburg's experience. He is not the only one. Freiburg is perceived as Europe's model green city by many Asian countries, notably China, South Korea and Japan. And eco-tourists, equipped with their solar street maps and bicycles for their solar

tour through Freiburg, are often pioneers blazing the way for 'regular' tourism and businesses that later settle in the area.

Freiburg is twinned with nine other cities, one of which is Isfahan, making it the only German-Iranian twinning. Freiburg is such an appealing candidate for twinning arrangements, not least because of its experience in environmental policy and renewable energies. Freiburg and Isfahan are already running some solar collaboration schemes and with Padua, another of its twin cities, Freiburg has constructed Italy's largest photovoltaic power generation plant through a jointly owned subsidiary. A US twin city, Madison, is currently planning the construction of a Sustainability Center based on the model of Freiburg's Solar Info Center. And for the years to come, Freiburg and Besançon in France have made an agreement to be in regular contact for exchanges on sustainable urban development. Freiburg is also in contact with Lviv in the Ukraine as part of a network of energy efficient Ukrainian towns. The aim is to modernize the planning of houses and renewable energies there as well.

There are also collaboration schemes in place with the cities of Seoul, Pyeongtaek and Suncheon, the Multifunctional Administrative City Construction Agency (MACCA) and the Yellow Sea Free Economic Zone (YESFEZ) in South Korea. MACCA is tasked with constructing the new city of Sejong to house approx. 500,000 inhabitants, some 100 km to the south of Seoul.

Solar roof of the Freiburg Trade Fair Centre





Visitors to the Intersolar



3rd Photovoltaics Industry Forum 2007 at the Congress Centre Concert Hall Freiburg



Visitors at the Fraunhofer Institute for Solar Energy Systems

Meeting point for the international solar scene

The mutual transfer of knowledge and technology, particularly biotechnology and solar technology, has been booming for years. Since its inception in 2000, Intersolar has grown to become the leading exhibition that sets the pace in the European solar technology sector. After eight thoroughly successful years, Intersolar said farewell to Freiburg after the 2007 fair and moved to Munich. Here, in 2008, the fair enjoyed record attendance figures – 53,000 guests and over 1,000 exhibitors. Filling the gap now in Freiburg are Gebäude – Energie – Technik (GETEC), [Buildings-Power-Technology], a new fair for the energy-efficient modernization, renovation and construction of buildings and the Freiburg Solar Summits, an annual gathering for the international solar scene attended by cutting edge authorities from science, industry and politics. The latter is organized jointly with the Fraunhofer Institute for Solar Energy Systems (ISE). 2008 also saw the birth of a sister event in San Francisco, Intersolar North America. Given the current pioneering spirit, particularly in California, this step across the pond is both necessary and pertinent with respect to climate protection and renewable energies and creates opportunities to benefit in the medium term from the burgeoning market there. In 2010, Intersolar India opened up in Mumbai, to be followed in 2011 by the inaugural Intersolar China in Beijing.

A further industry congress on renewable energies and energy efficiency, **Local Renewables Freiburg**, has been running here since 2007. This annual series of conferences is organized jointly by the City and the European Secretariat of ICLEI, the international association of local authorities (Local Governments for Sustainability), which makes its home here. This

- www.intersolar.de
- www.intersolar.us
- www.intersolar.in
- www.intersolarchina.com
- www.getec-freiburg.de
- www.local-renewables-conference.org
- www.solar-summits.com
- www.energieautonome-kommunen.de
- www.fwtm.freiburg.de

sets the stage for sector experts and local authority politicians, departmental heads, the staff of municipal environment bodies and energy service providers to deliver their inputs on research, development and the practical application of renewable energies.

Freiburg's annual influx of over 25,000 trade visitors from some 45 nations is not lured here because of the city's spectacular major projects or enormous solar factories. The appeal of Freiburg as a city and as a partner organization lies elsewhere, for no other location can boast a greater assembly of model projects, more 'green' expertise, sensitivity and political experience. The venerable university city has metamorphosed into a modern, forward-looking, workshop stimulating innovative and undogmatic reflection on new ways of blending the art of living, sustainability, ecology and economics.



Freiburg's presentation at Expo Shanghai 2010

The city's presentation at the world exhibition in Shanghai in 2010 was a great success for Freiburg. Running for six months, the exhibition recorded over 73 million visitors in total, 920,000 of whom visited the Green City Pavilion. It was the city's most prestigious

presentation so far on the international stage. In the Urban Best Practice Area, the Green City competed on equal terms with cities such as Seoul, Barcelona, Montreal, Venice, São Paulo, Osaka und London. Freiburg is – and intends to remain – Europe's climate protection center par excellence, an ambitious claim that was emphatically restated at the world's greatest exhibition of all time. Freiburg has shown itself to be a successful city imbued with vitality – where success is not solely due to the forward-looking companies and jobs with prospects prevalent here. The whole-hearted manner in which Freiburg embraces and interprets sustainability as the guiding principle of its urban development has engaged and resonated with visitors and earned the professional esteem of experts from across the globe. Together with the other participating cities, it has made one thing abundantly clear: the burden of responsibility for the world of tomorrow is the special province of local authorities.

www.expo2010.freiburg.de



Sustainable MOBILITY

Freiburg's traffic and transport concepts

In 1969, the City of Freiburg adopted its first General Traffic and Transport Plan. Since then, guaranteeing mobility without adverse impact on the natural world and the environment has been one of the declared aims of its urban traffic and transport policy. This policy, which has drawn attention across the country, promotes environmentally friendly modes of travel (on foot, by bicycle and local public transport). And it is not the only reason for Freiburg receiving the first European Local Public Transport Award in 1995.

Traffic and transport policy successes

Between 1982 and 1999 the volume of cycling measured as part of the total inner-city traffic volume rose from 15% to 27% and that of local public transport rose from 11% to 18%. During the same period, the volume of car journeys fell from 38% to 32%. Compared with other major cities in Germany, the private car density in Freiburg (423 vehicles per 1,000 persons) is extremely low.

Preventive measures to cut traffic

The primary goal of Freiburg's traffic and transport policy is to cut traffic levels. This is achieved by designing a compact city that can be crossed quickly, has strong local centers, develops along the main public transport arteries and gives preference to inner-city development over growth in its outskirts.



The main station – a traffic nodal point

All the major urban development decisions are subject to the overriding principle that traffic must be prevented. The measures are varied – for example, the construction of the new districts of Rieselfeld and Vauban both easily accessible by the light rail system, the development of inner-city university sites and the market and local center concept which gives priority to basic shopping facilities in the immediate neighborhood over supermarkets on greenfield sites.

Environmentally compatible modes of transport

The traffic prevention strategy is underpinned by the encouragement of modes of transport compatible with urban life and the wider environment. More than three decades of growth of the relevant infrastructures have favored walking and cycling and the use of local public transport, hence the prominence of bicycles and the bike taxis so beloved of tourists in today's cityscape.



The Breisgau-S-Bahn



Cycling paths in the Dreisam Valley



Bicycle station 'Mobile' at the main station





Vauban's Tram route

Parking space management and further development of the road network

Managing motorized road traffic in a way that is compatible with the city is Freiburg's third transport policy objective. There is continuous management of the parking spaces in many parts of the city. A system of financial incentives and charges, multi-storey car parks and parking guidance systems relieve residential areas near the city center of motorized traffic and parking space searches. The road network is being developed further to eliminate bottlenecks in particular and to divert away from residential areas any motorized traffic that cannot be totally relocated.



Tarif zones of the Regional Transport Association Freiburg

Cornerstones of traffic and transport policy

Since the introduction of the first pedestrian zone in 1973, Freiburg's traffic and transport policy is distinguished by the subtle but continuous onward development of further co-ordinated measures.

- The former tram system has been converted into a modern urban light railway system by the addition of new lines, increased service frequency and riding comfort and reaching almost all major parts of the city. 65% of all residents live within the catchment area of one of the system's stops.
- The Breisgau S-Bahn (urban railway) designed in co-operation with neighboring boroughs enables good and rapid connections between the city and the region and at the main railways station links into other regional and mainline rail services.
- In 1970, there were hardly any cycle tracks. Today, there is a compact, approx. 420 km-long network of cycle tracks and lanes and significantly improved facilities for cyclists including over 9,000 bicycle parking racks, 6,000 of which are in the city, links with local public transport ('Bike and Ride'), the city cycle route map, and more.
- Large parts of the city center are designated pedestrian zones and have been completely redesigned. The coming years will see further such upgrading of the urban environment.
- Pedestrians and cyclists also benefit from the extensive traffic calming measures in residential areas. By now, 90% of Freiburg's residents live on streets where the speed limit is below 50 km/h.



www.vag-freiburg.de
www.breisgau-s-bahn.de
www.rvf.de
www.freiburg.de/verkehr

The City's Resource Capital

NATURE

Green lungs: The city's woodland

Freiburg is a green city. 43% of the borough area is woodland (6,398 hectares). The City of Freiburg itself has 5,139 hectares, making it one of the largest municipal woodland owners in Germany. The city's woodland is both the lungs and green heart of the city and attracts approx. four million visitors a year, making it the most important recreational area near the city. Its location on the rim of the Black Forest, its natural abundance (90% of the city's woodland is a designated landscape conservation area, 15% is set aside as a biotope) and its outstanding infrastructure (450 km of woodland walks, sports, adventure, and instructional trails, shelters, barbecue and play areas, look-out towers, bathing lakes etc.) – all this makes it a major element in the appeal of Freiburg to tourists.

Recreation areas, forestry and ecosystems

It is no accident that the often quoted term 'sustainability' comes from forestry. A forest is a habitat for fauna and flora, an area for humans to enjoy leisure and recreation and it produces wood, a renewable raw material, stores groundwater and is indispensable for climate protection.

With the price of wood rising, the urban woodland also gains in economic importance. At the present time, annual timber felling (35,000 m³) yields earnings of 2 million Euro. However, as an ecosystem, forest can only be preserved and further developed if economic and ecological management work hand in hand. If wood from the local Mooswald is used to build kindergartens and condominiums, this is not only easy on resources and the pocket, but also safeguards jobs in the region.

■ www.freiburg.de/forstamt

The Mooswald

Learning from nature

Freiburg's Municipal Forestry Office oversees the Mundenhof animal enclosure, supports private and public institutions committed to nature and environment education and also organizes its own events, guided tours and excursions geared to teaching woodland lore. In one year alone – 2005 – attendance to the woodland biosphere reached 7,500. The Forestry Experimental and Research Institute and the Faculty of Forestry and Environmental Science enjoy a good reputation across the globe on forestry and climate ecology issues.

Sustainable woodland management

After the ocean, woodland is the most important carbon dioxide sink and so plays a central role in climate protection. This is why Freiburg has long been committed to sustainable woodland management at local, national and international levels. Since 1999, the Forestry Office is the first forestry body in Baden-Württemberg to be certified under the **Forest Stewardship Council (FSC)** guidelines, which allows it to market timber displaying the eco-label. This



means that high standards apply to the management of the city's woods, such as refraining from deforestation, pesticide and insecticides.

In 2001, the Freiburg Woodland Convention was adopted, the first of its kind at municipal level. The fruits of this were harvested in 2010, in the sense that the city is now committed to a policy of ecological, economic and social responsibility with regard to sustainable woodland management.

Since 2009, the City of Freiburg has officially supported the **Freiburg Convention on the Protection of Ancient Woodland** developed by Greenpeace Freiburg. One of the aims of this is to back more strongly the sale of local timber, preferably certified under FSC or Naturland rules.

Germany's highest tree,
a 65 m measuring
douglas fir in the
Freiburg Forest





The Black Forrest



The City Gardens

The green grass of home: Parks and nature conservation areas

Freiburg has acquired recognition for being a green feel-good city not only because of its many green spaces but also because it is located in a naturally green environment. 660 hectares of green spaces extend from the outskirts right into the heart of the city. Green is to be seen everywhere between Tuniberg in the west and the meadows of the River Dreisam in the east. There are landscape and nature conservation areas and parks such as the Seepark and the Möslepark, small gardens, children's playgrounds, cemeteries – even the rail tracks lie in a grassy bed.

Design elements, local recreation and play areas

For over 20 years, the city has been maintaining its public parks on principles that work with nature. The use of pesticides has long been abandoned, grass is now mown only twice instead of up to twelve times per year, which has significantly increased the diversity of species in the grassed areas. The many trees – 25,000 lining the streets and 22,000 in parks – improve the urban microclimate. 4,000 allotments help many families not only to enrich their diet and act as havens of retreat but also to create a closer relationship with the natural world.

Of the 160 children's playgrounds in Freiburg, 46 have now been returned to a more natural state in collaboration with children and parents.

■ www.freiburg.de/gruenanlagen

At Seepark



Conservation areas and biotopes

6,996 hectares, i.e. 46% of the Freiburg's territory, are landscape conservation areas and 683 hectares are designated protected areas. Under the guidelines of NATURA 2000, the European areas of conservation network, 3,623 hectares have protected status. In addition to this, there are more than 200 hectares of specially protected biotopes outside the conservation areas. Despite its confined area, Freiburg is host to a diversity of landscape and biotope types, ranging from the mountain meadows and woods of the Schauinsland mountain with their rare species of fauna, e.g. the capercaillie and flora, e.g. arnica, through the Mooswald to the dry and warm biotopes of the Tuniberg, which is colonized by many Mediterranean species, such as the emerald lizard. Plans are afoot to designate further landscape conservation areas on the southern slopes of the Tuniberg and in Ebnet.

Freiburg's Schauinsland area forms part of the Southern Black Forest Nature Reserve, which, at a total area of 370,000 hectares, is the second largest in Germany. As a member of the Southern Black Forest Nature Reserve Association, the City of Freiburg pursues the aim of continuing the development of the Southern Black Forest in terms of nature conservation, tourism, agriculture and forestry and urban planning.

Through its precautionary policy of maintaining conservation areas, the city has done much towards creating new recreation and adventure environments for people and at the same time safeguarding the natural heritage for future generations.

The City's resource Capital **NATURE**

Is the air clean? **Emission control**

As early as the 1990s, Freiburg drew up emissions registers and an air-quality plan. And Freiburg was also the first city in Germany to set up an ozone phone-in line. However, local action on emission control is soon faced with its own limitations because of numerous regional and extra-regional factors. Despite considerable effort through traffic and environmental policies, even the air in Freiburg is still polluted by fine-particle dust, exhaust fumes and ozone.

The clean air plan

In March 2006, Freiburg's Regional Authority (the Regierungspräsidium) drafted the Freiburg Clean Air Plan (LRP in German) under EU and federal framework directives. The LRP had become necessary because the permitted threshold values for nitrogen oxides (NO₂) in Freiburg were regularly being exceeded. Apart from traffic management measures, such as the construction of a tunnel under the city and further improvements to the local public transport system, the Clean Air Plan also contains provision for banning particularly polluting vehicles from 2010. This is why an area-wide ban on pollutant class 1 vehicles has been in force since January 2010 throughout the Freiburg Environmental Zone. From 1st January 2012, this area-wide ban will be extended to cover pollutant class 2 vehicles as well.

Clear conditions: **Soil protection**

The 2004 Soil Status Report for the Freiburg region documents contaminated sites and new environmental pollution in the soil and groundwater. This can help address new threats caused by acidification, soil surface sealing, erosion and loss of greenfield land. The report identified areas with vulnerable and contaminated soil and recommended precautionary measures, hazard prevention and land reclamation. Today, 5% of the city's woodland on the steep slopes of the Schauinsland is designated as protective woodland intended to prevent soil erosion.

The soil protection and contaminated area register

In 1991, like other cities, Freiburg started keeping a register of sites within the city boundary suspected of being contaminated. The last such survey was conducted in 2010. To date, over 1,814 cases of contamination have been registered and systematically evaluated by the Environment Protection Office and, where necessary, also safeguarded and reclaimed. The data held in this register helps land owners and planners to recognize promptly and take note of risks to people and the environment.

View of Freiburg from the Hilda Tower





Fishing in the Dreisam River



Idyllic old town quarter of Gerberau



Rowing on the Waldsee

Go with the flow: Go with the flow:

Increasing land use, soil surface sealing and the growing risk of extreme weather and heavy rainfall posed by climate change all combine to give greater importance to flood protection. Under EU and national law, maps of areas at risk of flooding must be created for the areas affected by not later than December 2013. New construction in areas known to be at risk of flooding will only be allowed – if at all – subject to strict conditions. New construction, renovation and extension of rainwater retention basins help to protect at-risk residential areas.

Designing watercourses as naturally as possible

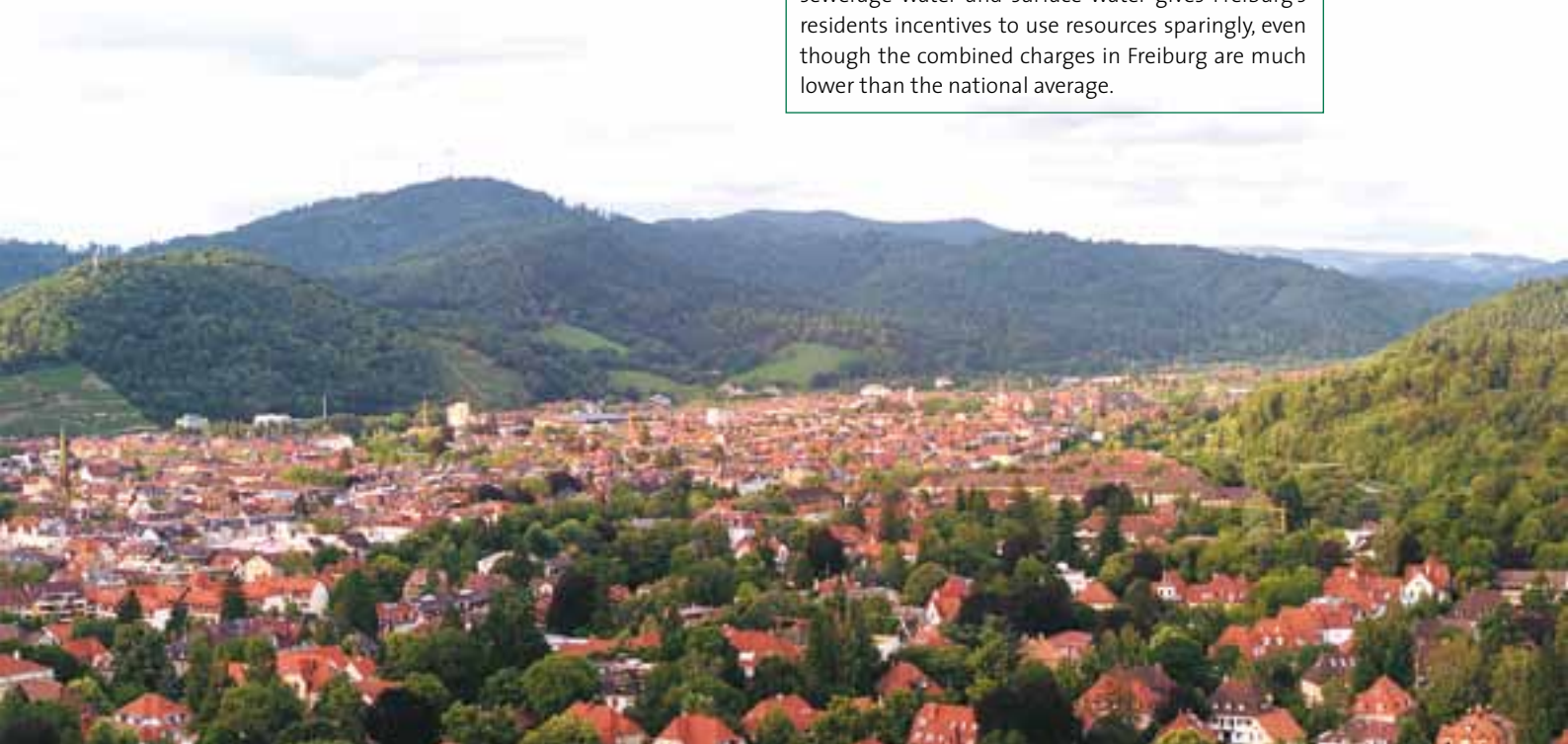
Another area of growing importance is watercourse management in conditions as close to nature as possible, as stipulated by the watercourse development plans. This entails correcting ecologically misguided developments, such as the straightening of watercourses or making them resemble canals. Ways of doing this include the creation of water margin areas or redesigning the bed of the watercourse. For example, some older weirs in the River Dreisam were replaced by devices known as river bottom ramps, which in some places have the effect of killing two birds with one stone. Fish can now once again migrate upstream whilst at the same time water power can be converted into environmentally friendly energy.

Premium quality water

Groundwater, our most important source of drinking water, must be protected against agricultural and industrial pollutants. Rainwater is too valuable to be allowed to disappear down the drains. As water seeps through green areas these filter out pollutants, promote the creation of new groundwater and drain water away from surface watercourses and combined sewer systems. Ecological rainwater management begins with the avoidance of excess surface drainage, for example by integrating water-permeable surfaces and green roofs in the construction plan. It has long been standard practice to integrate centralized or decentralized seepage areas in new built up areas.

A traditional form of waste water disposal

The little watercourses called Bächle running down the sides of streets have been the pride of Freiburg since the early Middle Ages. The first sewers were built in Freiburg in 1880. Today, the city has a modern sewer system that combines effectiveness with ecological principles. The aim is that, wherever possible, precipitation should be retained and used on the property on which it falls or, failing that, be allowed to percolate straight into the groundwater. A system of charges that distinguishes between sewerage water and surface water gives Freiburg's residents incentives to use resources sparingly, even though the combined charges in Freiburg are much lower than the national average.



Sustainable URBAN DEVELOPMENT

Far-sighted planning and citizen participation

Land Use Plan

Nowadays, cities face a challenge, because they need to organize the use and development of shrinking land resources in ways which are environmentally and socially acceptable. Land Use Plan 2020, which has been in force since 2006, has pinned its colors on cutting land use as much as possible and covers approx. 30 hectares less building land than the predecessor plan.

Landscape Plan

Landscape Plan 2020 sets out the view of the city's council and administration on the development of nature and landscape, the environment and recreation until 2020. Targeted nature conservation measures will expand valuable living space for humans and animals and form links between them to create a network of biotopes across the city.

Open space concept

The effect of the Land Use and Landscape Plans 2020 has also been to revise the open space concept with reference to the future design of the Freiburg cityscape. Quality open spaces are important factors in the cultural, historical and aesthetic identity of Freiburg. Whereas once new local parks such as the Seepark and Dietenbach were at the top of Freiburg's agenda, now greater attention is being paid to inter-linking the open spaces within and with the city's built environment and to adapting the green spaces to demographic and climatic changes. The journey itself is the reward.



City administration in dialogue with the citizens

Urban climate concept

In an era affected by climate change, the task of creating a healthy and balanced urban climate gets ever more challenging. The urban climate analysis of 2003 has led to greater emphasis in the Land Use Plan 2020 on keeping cold air pockets and urban ventilation corridors inside and outside the city free of buildings.

Innovative energy concepts

In Freiburg, energy savings principles and 'solar optimization' enter into drafts and plans at an early stage, as exemplified by the alignment and siting of buildings or Freiburg's mandatory efficiency house standards. Energy concepts are drafted for all building areas and the most environmentally compatible energy supply option is specified contractually, provided this can be achieved at the same or relatively low additional expense (max. 10%).

Citizen involvement

Land Use Plan 2020 may be regarded as a successful example of citizen involvement. The first step, in 2003, was the definition of visionary goals by groups of citizens, which one year later were adopted by the city council as framework conditions for Land Use Plan 2020. These were ecological compatibility, social justice and economic viability. In 2005, citizens formed 19 working groups to discuss each of the potential construction areas covered by Land Use Plan 2020. The city council determined the key points of the plan in the light of the outcome of these discussions.



City architectural master plan for Rieselfeld



Vauban Tram line



Living in the Vauban Quarter

Planning of modern districts and neighborhood development

Rieselfeld – visionary ecological living in the state's largest neighborhood project



In an area measuring 70 hectares, the largest neighborhood project in the federal state of Baden-Württemberg is on track for 4,200 dwellings to house between 10,000 and 12,000 people by the year 2012.

Early in 2010, over 9,200 residents occupied approx. 3,500 dwellings – built by over 120 private home construction associations and investors – in the new district of Rieselfeld. The positive image, the comprehensive public infrastructure tailored to needs and the unblemished life of the district make Rieselfeld a

sought-after address for landlords and tenants. In this district, citizen involvement and active co-operation are both writ large. The district is immediately adjacent to a nature conservation area measuring 250 hectares and available to Rieselfeld residents as their local recreation area.

All the houses are built to low-energy standards. Many houses use photovoltaics and solar thermal technology to capture the sun's energy. Other forms of renewable energy utilization and remote heating from a combined heat and power station complement the forward-looking energy concept of this fledgling district. Other design cornerstones are a consistent water concept and consideration of climatic aspects. Important ingredients in the urban planning concept are green, play and open spaces plus cycle tracks and play streets.

www.freiburg.de/rieselfeld

Quartier Vauban – urban development with ecological awareness

The Vauban Quarter was created on an area of 38 hectares close to the city center on land formerly occupied by the barracks of the French military forces. It is an attractive, family-friendly neighborhood for 5,000 residents, strongly characterized by citizen involvement, collective building and environmentally aware living. Low-energy construction methods are mandatory. Zero-energy and energy-plus construction, heating supplied by a remote heating network run on renewable energies and the use of solar technology come as standard for most buildings.

As many of the existing trees as possible have been preserved. Green spaces between the rows of houses have beneficial effects on the climate and provide play areas for children. Private development was

accompanied by the associated infrastructure – schools, kindergartens, youth facilities, meeting places for residents, a market place plus leisure and play areas. Flat green roofs store some of the rainwater which is then collected and retained



for later use.. The residential area has been traffic-calmed. Whole streets are devoid of parking spaces because many households are completely car-free and any private cars must be parked in one of the district's two garages. Since 2006, the residential area has been on the city's light rail system, which is why many people can do without a car, using either public transport or their bikes instead.

www.freiburg.de/vauban

'Sun Ship' in the Schlierberg's solar settlement area



CITIZEN

COMMITMENT

Thinking global, acting local – Freiburg is on board

In 1992, the UN Conference on Environment and Development in Rio de Janeiro adopted Agenda 21. Freiburg is on board and since 1996 has been acting on the signal sent out from Rio - "Thinking global, acting local". The city signed the Aalborg Charter, committing itself to developing its own Local Agenda 21. Seven working groups elaborated the principal ideas and objectives for sustainable urban development.



„Eine-Welt-Tage“ am Seepark

Freiburg's Agenda 21

Under the aegis of Freiburg's Local Agenda 21, dozens of projects and initiative groups are working on integrating the global sustainability concept into local practices. For example, the One World Forum, together with the City, organizes Freiburg's One World Days and markets fair trade coffee from Nicaragua. With projects such as Deluge 21, Future Lifestyles, and the Blue Treasure Chest, Freiburg's Eco-Station draws attention to our global responsibility. The Saturday Forum run by ecotrinova e. V. and the University organizes well-attended

lectures and excursions on climate protection and sustainable development. So far, 21 of the Freiburg Local Agenda 21 projects have been funded with a total topping 200,000 Euro from state resources.

Aalborg Commitments

In 2004, the Aalborg Commitments were adopted at the Aalborg Plus 10 follow-up conference. Freiburg signed this agreement in 2006, committing itself and the city's residents to the following:

- developing models to cut energy consumption and increase the percentage use of renewable energies;
- integrating climate protection into the fields of energy, mobility, procurement, waste management, agriculture and forestry;
- giving greater prominence to sustainability aspects in urban planning and
- promoting public awareness of the causes and consequences of climate change.

Cooperation between citizens, Agenda 21 groups and the city's administration was revitalized and given a new organizational basis through the creation of a Sustainability Council for Freiburg. The Council's remit is to bundle innovation potentials, bring together visionary thinkers and disseminators of sustainability concepts and advise the city council and administration on implementing the Aalborg Commitments.

www.agendaz1-buero-freiburg.de



Joint action: "Freiburg makes a difference"



Seeing, listening, knowing – Environment education in Freiburg

“You only see what you are aware of, and you only protect what you know.” This motto of Freiburg’s Nature Adventure Trail still holds true and so, to be won over to the cause of environment protection and nature conservation, people need opportunities to learn it through their own direct, practical, hands-on experience. Environmental education begins at kindergarten, elementary school levels.

School commitment

Numerous initiative groups, groups and bright ideas, such as a Benefit Run to raise funds to enlarge a school’s own solar energy plant show the level of commitment of Freiburg’s schools to climate protection. Many of these projects focus on waste prevention and water and energy saving and are supported by the city with money and equipment.

Opportunities for extracurricular learning

Outside of school as well, there are a host of different ways of learning about the environment under city guidance. For example, the Forestry Office maintains nature adventure and instructional woodland trails, organizes guided tours and project days for school classes and supports private woodland kindergartens. These give children an understanding of the woodland ecosystem through play inspired by the Office’s expertise in teaching woodland lore at particular sites in the woods.

The **WaldHaus Freiburg** is a competence center dedicated to the subjects of woodland and sustainability. Its mission is to consolidate the various educative enterprises on woodland and the environment, give them a professional basis and encourage exchanges in the field of woodland and sustainability with other countries and specialist disciplines.

Since its establishment in 1986, the **Freiburg Ecostation**, the environment center of the Environment & Nature Conservation League (BUND) in the Seepark, has been running seminars, guided tours and events covering the whole range of environmental subjects from solar energy to ecological construction.



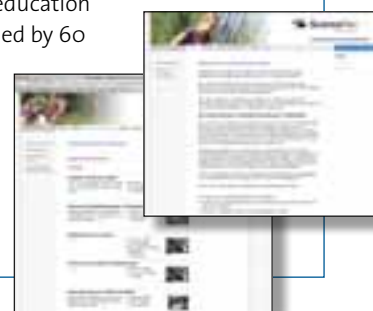
Schulklassen beim Besuch der Ökostation

The **Stadtgut Mundenhof** is an animal enclosure, organic farmland nature education center all in one. In the KonTiKi project, children – either individually or in classes – learn how to handle pets from all over the world and through play gain a valuable understanding of nature, the environment and the right ways to keep different animals.

The **Freiburg Planetarium** not only looks out to remote galaxies. It also focuses on planet Earth and its biosphere and on subjects such as the water circulation, the greenhouse effect and the significance of the sun for the future supply of energy.

ScienceNet in the Freiburg region

Since 2007, teachers, schoolchildren and other interested parties have been able to use this internet portal to get an overview of more than 260 curricular and extracurricular education opportunities provided by 60 bodies.



www.oekostation.de
www.freiburg.de/mundenhof
www.freiburg.de/planetarium
www.sciencenet-region-freiburg.de

Going for GREEN

Sustainability, future viability and quality of life: forces driving quality growth

Sustainability, future viability and quality of life are the forces driving forward Freiburg's long-term business location policy and putting the city on track for quality growth. For the Green City, sustainability is not simply a matter of ambitious environment and climate protection concepts. Instead, it is seen as the springboard for positive developments in the economy, education and science.

Freiburg's deliberate policy in recent years of fostering sustainable environmental, solar and bio technologies has given the city a decisive edge in an international competitive environment and done much to enhance its appeal and quality of life. There is more to Freiburg's approach to life, its lifestyle and culture than the pride and pleasure it inspires in its residents, because the city attract students, creative thinkers and investors from across the globe. This ensures that the population continues to grow and so creates the right conditions for the city's socially balanced and economic success through knowledge-based development.

Today, the city leads the country in job creation, population and economic growth and the number of overnight stays, which in 2007 reached the million mark for the first time. Freiburg's above average employment figures in the fields of environmental economics, education and research coupled with the growth in interest from both home and abroad reflect the great significance and high value placed on sustainable urban development as experienced here.

Freiburg's approaches to sustainability are efficient, innovative, economically successful, ecologically exemplary and socially balanced. Here, sustainability and a vibrant economy, groundedness, future viability, scientific excellence, quality of life and a life-affirming attitude all point towards the same goal. As an ideal Green City, Freiburg has become a successful role model for Germany and Europe.



Photovoltaic module manufacturing at the Solar Factory





College Building I at Freiburg's University

IMPRINT

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Science Days for children



Rappenecker Hof – powered by solar energy since 1987




Freiburg in the heart of Europe



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