

environmental and climate protection in freiburg



the
basics
of life

quality
of
life zones

from
knowledge
to action

Freiburg 
IM BREISGAU



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A pioneer in environmental and climate protection



Freiburg remains an environmental and climate protection role model. In the reports of domestic and international media or, on location, among the more than 25,000 expert visitors from around 45 nations – the ambitious environmental and sustainability policies of the City of Freiburg garner global attention and respect.

For many years, the City of Freiburg has made investments into numerous activities and projects aiming at the reduction of CO₂ emissions. For instance, the exemplary district of Vauban is known for its energy conserving residences and a transportation concept with a small environmental footprint. The aspiring goal of project “Green Industry Park” is to further develop Freiburg’s largest industrial zone into an energy efficient and resource conserving industrial park in cooperation with the businesses domiciled here. The new city hall “im Stühlinger” produces more energy for heating, cooling, ventilation and lighting than it needs through regenerative sources.

Henceforth, the City of Freiburg will continue to strongly advocate for the climate and the environment. One aim is to make the new District of Dietenbach climate-neutral. The Climate and Species Protection Manifest, which was passed in 2019, requires the verification of all town council decisions for their climate and biological diversity impact. The financial budget for climate protection projects was simultaneously significantly increased.

On the following pages you will find a wealth of interesting environmental and climate protection facts related to Freiburg. I hope that you will enjoy the read.

A handwritten signature in blue ink that reads "M. Horn". The signature is enclosed in a thin black rectangular border.

Martin Horn
Lord Mayor

Freiburg's journey to a climate neutral city

For decades, the protection of the environment and climate have been topics discussed by politicians, administrations and among the citizenry in Freiburg.

Urban climate protection goals were first defined in 1996. Reviewing as well as updating them and raising the bar each time is a community task. The town council made its most ambitious decision in favor of climate protection in early 2019: greenhouse gas emissions are slated to be reduced by 60 percent over comparison year 1992. Freiburg aims to be climate neutral by 2050. Freiburg's Climate Protection Fund is making an important contribution to the funding of the comprehensive climate protection measures. Since 2020, 50 percent of the annual earnings from the licensing fee of energy utility "badenova" are transferred to the fund – about six million euros. All new communal measures have to be planned in a climate neutral manner.



In the densely populated urban areas, the energetic modernization of existing buildings is a highly important aspect on the path to climate neutrality. Since 2002, the municipal subsidy program "Energiebewusst Sanieren" [Energy Conscious Refurbishment], which was renamed "Klimafreundlich Wohnen" [Climate Friendly Living] in 2019, has supported the efforts. Hence, Freiburg was able to attain an above average refurbishment rate of 1.6 percent per annum. The goal is to increase the quota to 2.2 percent per annum through 2030.

The City of Freiburg sets a positive example with its own properties. Over the past 28 years, the municipal properties' CO₂ emissions based on heated space could be reduced by more than 53 percent. On the one hand, this was possible because of the energetic refurbishment of the exteriors and technology of buildings, on the other hand, Freiburg's Building Management is setting high standards for the operation and user behavior. The passive solar standard is effective for the new construction of municipal buildings.

In Freiburg, environment and education do not just go hand in hand when it comes to the renovation of school buildings. Education for Sustainable Development (BNE) is an interdisciplinary topic in this city. It has established itself in many areas already. A diverse range of school projects make children and youth aware of environmental and climate protection issues. They are often supported by dedicated associations and initiatives. Freiburg boasts a vast range of them. Besides scholastic programs, Freiburg has the Eco Station, the Wald-Haus, the Weingarten adventure playground, the children's adventure farm Vauban, the Solare Zukunft e.V. association and the

planetarium, i.e. a long list of extracurricular education facilities and providers, who also receive funding and support.

In addition to climate protection, biodiversity plays an important role in Freiburg. Numerous measures aim at fostering and maintaining the intactness of nature. One example is the Biotope Association "im Mooswald," as well as pesticide free farming on municipal lease hold land or the nature-oriented care for municipal green spaces. By passing the Freiburg Climate and Species Protection Act in 2019, the City of Freiburg has made it clear that it will enthusiastically advocate for the protection of the climate and species going forward.



Gerda Stuchlik

Mayor for Environmental Protection, Youth and Education Advocacy

Climate neutral mobility and buildings

In the climate neutral metropolis of the future, buildings produce more energy than they consume. Mobility will be driven by climate neutral fuels, such as renewable energy generated electricity or muscular force. Priority will be placed on regional public transportation (RPT), walking and bicycling. The principle of "using instead of owning" will also gain importance. These visions of a climate neutral and livable town are worthy goals for all, including politicians and administrators. The sectors transportation and buildings play a decisive role for climate and environmental protection on the one hand and quality of life on the other hand not only as far as this is concerned.

Despite the high density of structures, sustainable urban development always must provide sufficient open spaces that are close to nature. Freiburg has always managed its spaces prudently. High urban density was implemented in excellent urban development quality in all new construction areas. New buildings have been subjected to stricter than federal mandates since 1992. Moreover, the "Freiburg Efficiency Building Standards" have been consistently elevated. New districts, such as the Dietenbach construction zone, are required to be entirely climate neutral if possible. In the future, the focus will not only be on the energy needed for the operation of the buildings, but increasingly on the topic "Gray Energy" in building materials and even the actual construction of buildings.

Thanks to the compact urban development and measures, such as the store and centers concept, Freiburg is a short commute city. The relatively level topography also makes it ideal for bicycle travel. Since it implemented its first bicycle path in 1970, Freiburg has consistently expanded its bicyclist network. Step by step, the city also implements additional measures fostering travel by bicycle, such as the construction of bicycle storage stands or priority traffic light settings.

In recent years, Freiburg also rolled out targeted pedestrian traffic programs. Another helpful fact is that city planning integrated the RPT, specifically the city tram, in all of its concepts from the start. In combination with the expansion program of recent years, the city now has a city tram network through which the VAG almost completely covers the residential and business districts with premium quality RPT services. The Breisgau-S-Train travels regionally. Customers may use the popular RegioKarte to use all RPT services for a budget price.



Nonetheless, too many vehicles still crowd Freiburg's streets either driving or parking. In the transportation sector, the emissions have not declined. This situation prevails although the City of Freiburg even attempts to counter the dilemma with measures that are not always popular, such as the reduction of parking spaces, high parking fees and speed limits. Freiburg will have to continue to pursue this strategy; however, these ambitious climate protection goals will not be attainable in the absence of accompanying transportation policies by the EU, federal and state governments. However, it is a journey worth taking! Everyone will reap the benefits if we take environmental and climate protection seriously. The climate and the environment will benefit directly; the citizens will enjoy first-rate quality of life in an urban setting amid an intact environment.

A handwritten signature in black ink, appearing to read 'Martin Haag'.

Martin Haag

Mayor for Urban Development, Construction and Mobility

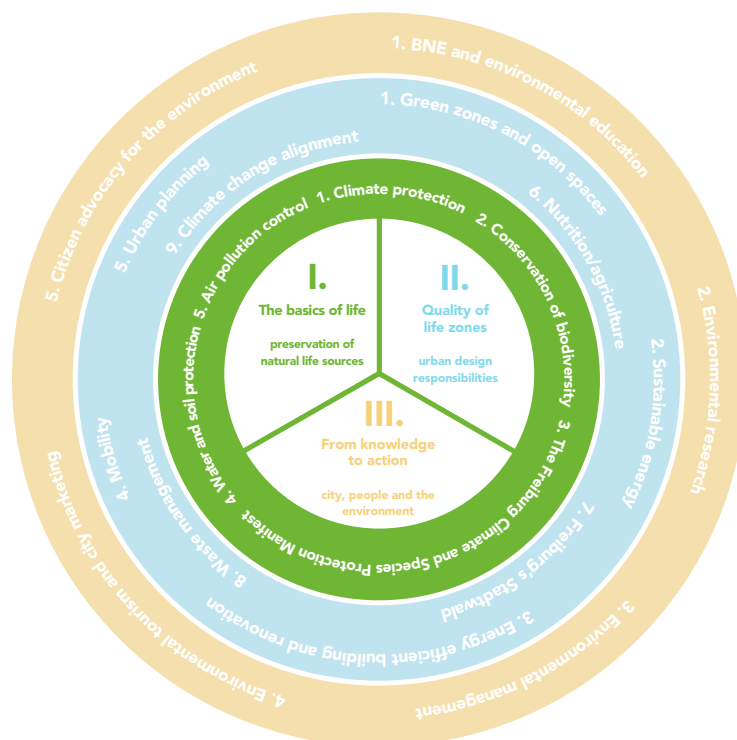


THE BASICS OF LIFE

**preservation of
natural life sources**

I.

1. Climate protection
2. Conservation of biodiversity
3. The Freiburg Climate and Species Protection Manifest
4. Water and soil protection
5. Air pollution control



1.1 Climate protection

Climate protection is the most important global challenge

The consequences of climate change are evident around the globe. They are caused by the combustion of fossil fuels. The earth is already one degree Celsius warmer, which leads to the proliferation of extreme weather conditions, such as droughts, storms or heavy rain. Rising sea levels make coastal areas uninhabitable and the melting glaciers put the water supply in jeopardy. Never before since the planet was settled by humans have the general climatic conditions changed as much. Ultimately, we are destroying the basics of life all creatures need. In this context, climate protection is not just an environmental issue.

Climate change has a massive impact on all of society and results in significant economic and social costs. Not taking or deferring action when it comes to climate protection will multiply the costs compared to an expeditious and ambitious implementation of climate protection measures. Hence, on the communal level as well, we must understand cli-

mate protection not as a sectoral issue, but structurally anchor it as an interdisciplinary topic.

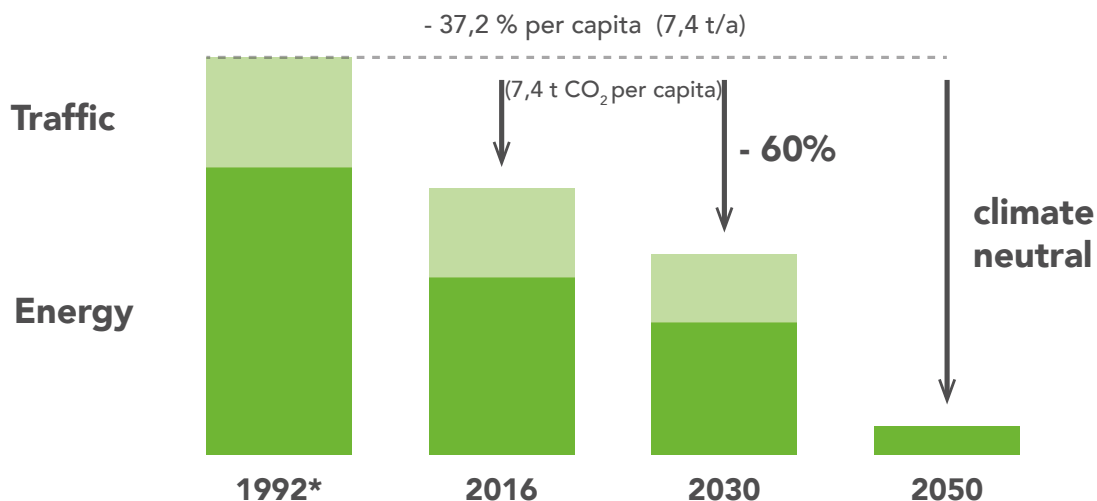
Freiburg's climate protection strategy

Since the UN Environmental Convention of 1992 in Rio de Janeiro, climate protection has been on Freiburg's political agenda. Four years later, the town council, in the first Freiburg Climate Protection Concept, defined concrete goals for the city. Since then, it has a municipal climate balance sheet drawn up at regular intervals.

In the internationally established base year 1992, Freiburg emitted a total of just over 2.2 million tons of greenhouse gases into the atmosphere. Per person, this translates into close to twelve tons a year. In the subsequent years, resolutions made by the town council updated and made the climate goals fiercer.

In 2014, Freiburg decided to reduce its greenhouse gas emissions to half by 2030 compared to base year 1992 and to render the city climate neutral by 2050

Reduction of greenhouse gas emissions in the City of Freiburg



– ambitious goals. In 2018, the Eco-Institute and the ifeu-Institute passed the most recent update of the Freiburg Climate Protection Concept. The comprehensive participation process, which included residents and important stakeholders, was new. Scientists examined the potential, computed scenarios and described 90 priority climate protection measures in detail. The city plans to implement these goals in the years to come.

In 2019, in compliance with the scientific recommendations, the town council increased Freiburg's CO₂ reduction goals to 60 percent by 2030; however, subject to the condition that the necessary general federal framework is created. The goal of complete climate neutrality is still in effect for 2050.

Freiburg's climate balance sheet

To systematically track and monitor its progress in climate protection, the City of Freiburg has had a climate balance sheet compiled in two-year intervals since 1992. It includes information on the development of the different sectors' CO₂ emissions.

Hence, the municipality is in a position to recognize the latest CO₂ emissions developments and to verify whether the



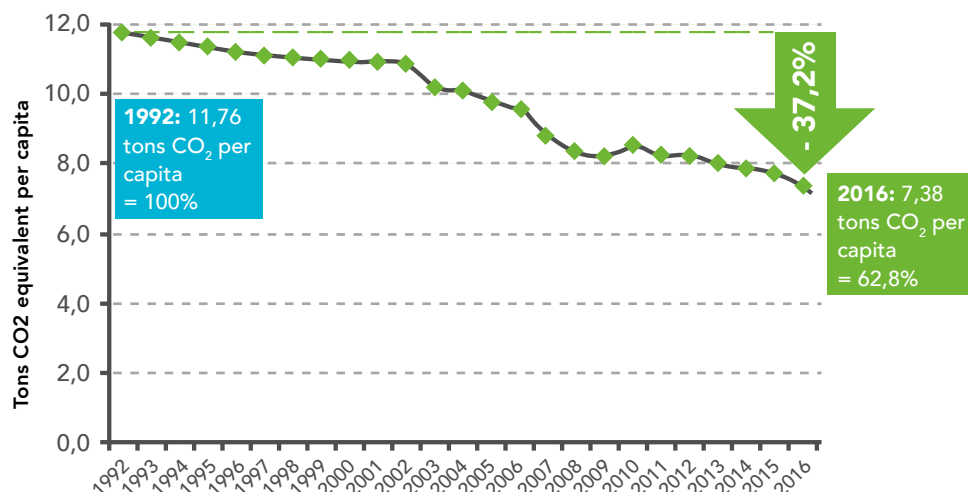
Earth Hour in Freiburg

deployed greenhouse emissions reduction measures deliver the desired effects. In 2016, Freiburg's CO₂ emissions of 7.38 tons per person were 37.2 percent lower than in 1992. In absolute figures, the CO₂ emissions of all sectors totaled 1.65 million tons, which is equivalent to a reduction by 27.3 percent. Since 1992, on average, the whole city reduced its greenhouse gas emissions by 26,000 tons per annum.

Although Freiburg has consistently grown in recent years and continues to do so, it was able to reduce its absolute CO₂ emissions. This goes hand in hand with a reduction of the per capita output. At the same time, it is evident that the municipal goal of reducing greenhouse gas emissions by 60 percent by 2030 is

CO₂ per capita 1992 through 2016

Total based on the balance sheet standard communal with weather adjustments



a huge challenge. To achieve this, it will be absolutely essential to continue to strengthen as well as intensify the efforts of all climate protection participants on all levels. The attainment of the climate protection goals hinges on it. By passing the Climate Protection Concept of 2019, the town council has laid the foundation for the launch of many new climate protection projects and the reinforcement of proven projects.

Freiburg's Stadtwald – A key contributor to climate protection

Forests bind and store carbon. It remains in durable wood products. The energetic and material usage of wood also prevents the emission of carbon dioxide. Hence, Freiburg's Stadtwald (Town Forest), which spans 43 percent of the cadastral area, and its cultivation make critical contributions to climate protection. Climate aware forestry ensures that the overall climate protection effects are protected and, if possible, expanded.

Effective forestry activities of the municipal forestry management include the continuous preservation of regrowing wood, the maintaining of a largely stable wood inventory and diverse forest age reduction among the existing growth. At the end of the cycle, it is also important to sustainably utilize the wood, preferably in timber construction and interior buildouts, where wood, because of its technical properties and quality can be used longterm.

In concrete figures, the climate protection results of Freiburg's Stadtwald were presented in conjunction with a forest climate fund project. Modeling the forest development through 2100, the Town Forest removes around 54,500 tons of CO₂ from the atmosphere each year. Of these, 14 percent go to the carbon storage in wood because of the already high wood inventory (especially decommis-

sioned and dead wood areas); 86 percent are contributed by the usage of wood grown and harvested in the Town Forest. Over a shorter period through 2050, the annual CO₂ reduction increases to 62,600 tons, which is equivalent to 3.6 percent of the city's CO₂ emissions. Currently, the climate protection output of the forest is not part of the City of Freiburg's climate balance sheet.

Money for the future – Freiburg's Climate Protection Fund

The town council provided an additional budget for climate protection measures as early as 2004. Initially, ten percent of the earnings from the licensing fee the city receives from regional energy and water utility "badenova," were supposed to be reinvested into additional climate protection measures of the municipal agencies and participations. This was a one-of-a-kind model in all of Germany. However, it did not end there: first, the town council decided to increase the amount to 25 and later to 30 percent. In April 2019 in conjunction with the Freiburg Climate Protection Concept, it boosted the licensing share contribution for climate protection to 50 percent. Currently, around six million euros go to the Climate Protection Fund – a future-oriented investment.

Climate friendly living – promoting structure-related climate protection

Energy consumed by buildings is one of the key issues in communal climate protection. Especially the energetic renovation of existing structures offers significant conservation potential.

Hence, the municipal subsidy program "Energy Conscious Refurbishment" was launched in mid 2002. It now operates under the heading "Climate Friendly Living." Thus far, the City of Freiburg has disbursed 4.85 million euros in direct contributions and hence supported

about twelve percent of Freiburg's buildings with energetic renovations. The program takes a sweeping approach: wall, roof or cellar heat insulation and window replacements are sponsored depending on the size of the renovated areas. Subventions of up to EUR 5,000 for single family homes or duplexes and up to EUR 14,000 for multi-family homes are available to each applicant. Vast refurbishments that turn a house into a KfW Efficiency Home are particularly attractive.

For these, Freiburg offers bonuses ranging from EUR 1,000 to 7,000, depending on the efficiency class. An enthusiastically embraced special bonus supports the use of certified insulation materials that have a very small environmental footprint (e.g. with the Blue Angel or Natureplus seal). In September 2019, the subsidy program was expanded and now also comprises photovoltaic systems on facades, on intensively used green roofs and combined photovoltaic/solar thermal collectors. The innovation subvention totals EUR 150 for each installed kilowatt up to a maximum of EUR 1,500. Moreover, Freiburg now also sponsors tenants and gardeners who do not have their own roof for the us-

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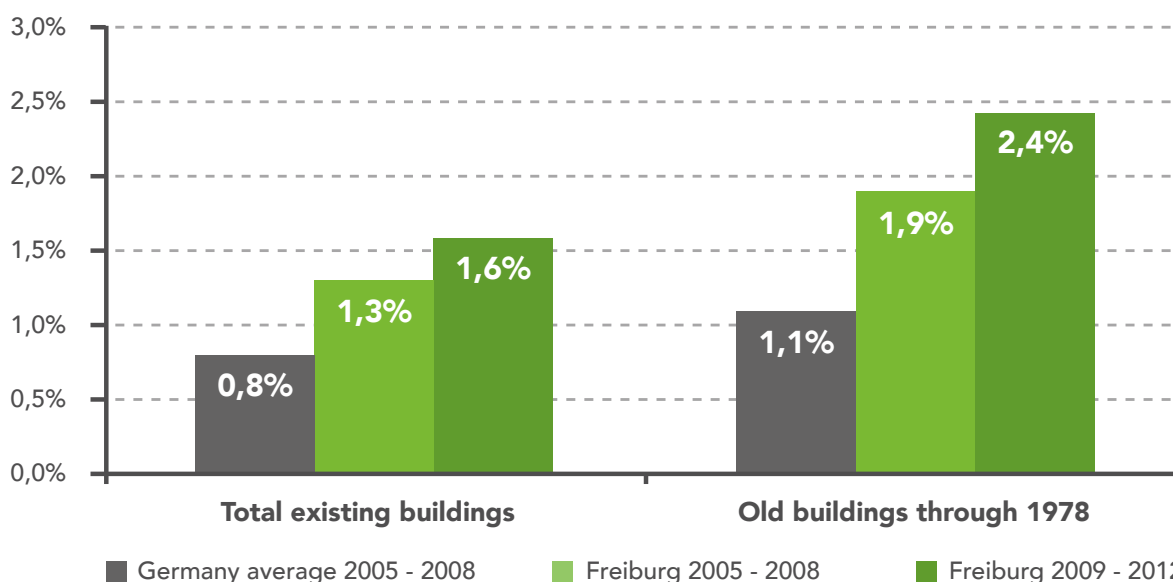
Freiburg

The municipal subsidy program "Climate-Friendly Living" supports the energetic renovation of buildings.

age of solar energy: balcony modules or mini PV systems are eligible for a lump sum subvention of EUR 200 for the connection costs of an infeed plug. There is also a lot of demand for funding for battery storage units for new photovoltaic systems.

Around a quarter of the less than ten kilowatt systems commissioned in Freiburg in 2018 received funding from the municipal program.

Comparison of the renovation rates



Heat production is another component of more climate friendly structures. Hence, environmentally friendly boilers are eligible for a one-time lump sum contribution of EUR 1,000. This is contingent upon the obsolete boiler having been installed prior to January 1, 2000 and upon the use of renewable energies, e.g. solar thermal, pellets or wood chip fuels.

Homeowners who connect their building to a heat supply network or combined heat and power plant also contribute to climate protection. Hence, both measures are eligible for funding within the program's scope. Subsidy program "Climate Friendly Living" also plays an important role in the Freiburg Climate Protection Concept, which was updated in 2019. Scientists explicitly point out the above average renovation quota in the building sector of currently 1.6 percent in Freiburg (federal average close to one percent). However, to attain the climate protection goals, the energy consumption of buildings will have to be reduced even further. The aim is to increase the renovation quota to 2.2 percent by 2030 through an expanded subsidy program and increased publicity.

From industrial zone to "Green Industry Park"

Industrial operations and companies also advocate for climate protection in cooperation with the City of Freiburg. The networking of all key players is an important component, for instance in an industrial zone. The interdisciplinary cooperation between businesses creates the foundation for an intelligent approach to energy production, storage and use beyond the boundaries of the individual companies.

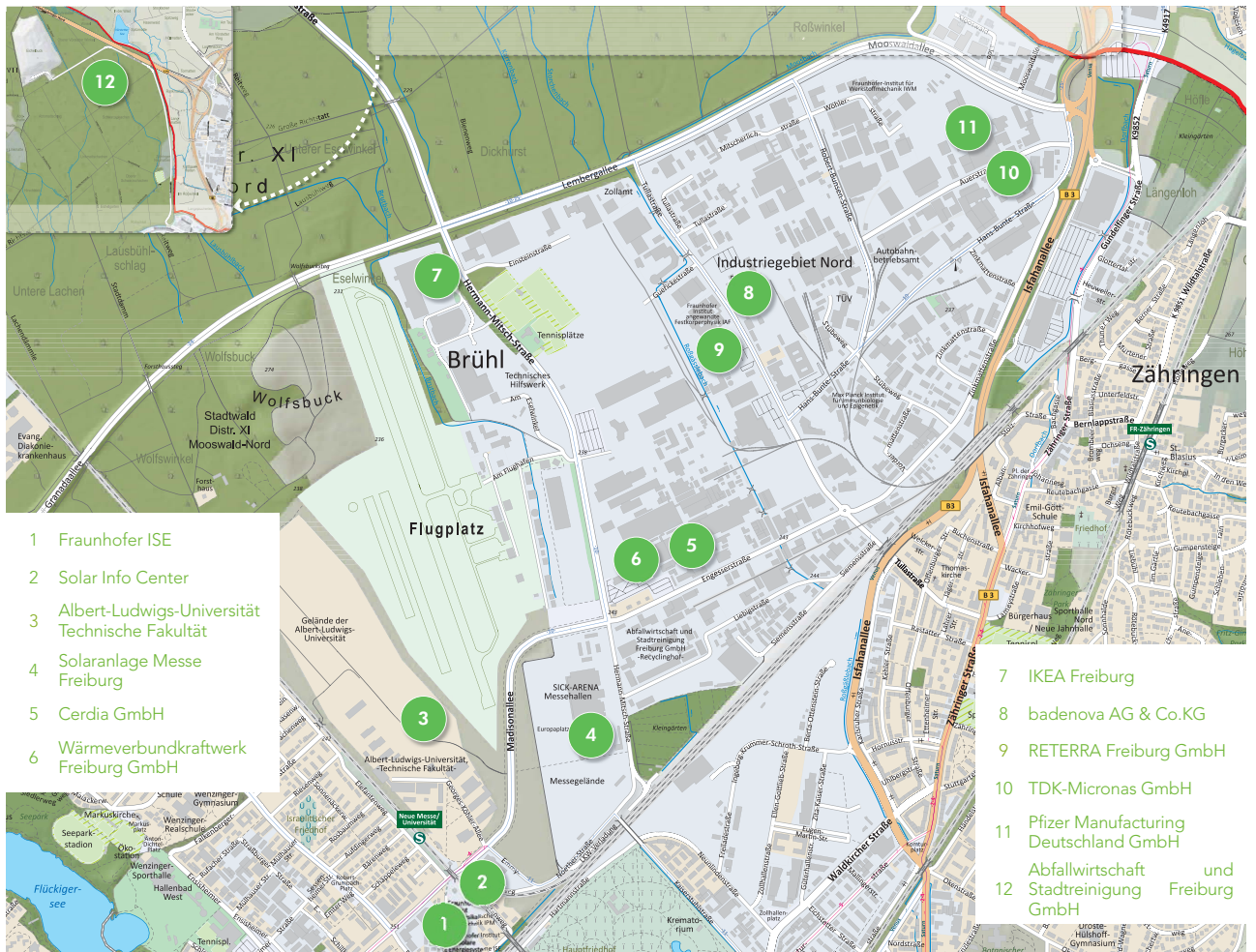
Based on this, the City of Freiburg, energy utility "badenova," the Fraunhofer ISE and the communal business sponsoring association FWTM, have come up with a new approach: the "Green Industry Park Freiburg" initiative launched in February 2014, along with local companies, pursues the plan to turn the industrial zone "Nord" into a sustainable, energy and resource efficient industrial park that acts as a model for all of Germany. The objective is to network engaged enterprises and to find solutions on the level of individual operations, with the aim of more efficient resource use.

Companies who have at their disposal unused radiant heat, can for instance transfer the heat to nearby operations that need the heat. Cerdia (formerly Rhodia) is one of these businesses: it manufactures cellulose acetate filters, which results in the production of large amounts of radiant heat, which was not utilized to date. Hence, the company transferred 5.3 million kilowatt hours of heat to the environment each year, which is equivalent to well over 500,000 liters of heating oil.

In the future, "badenovaWÄRMEPLUS" will deliver the heat to several properties on adjacent land parcels. The hot water escapes production at a temperature of around 50 degrees. To date, it had to

The new Freiburg football stadium





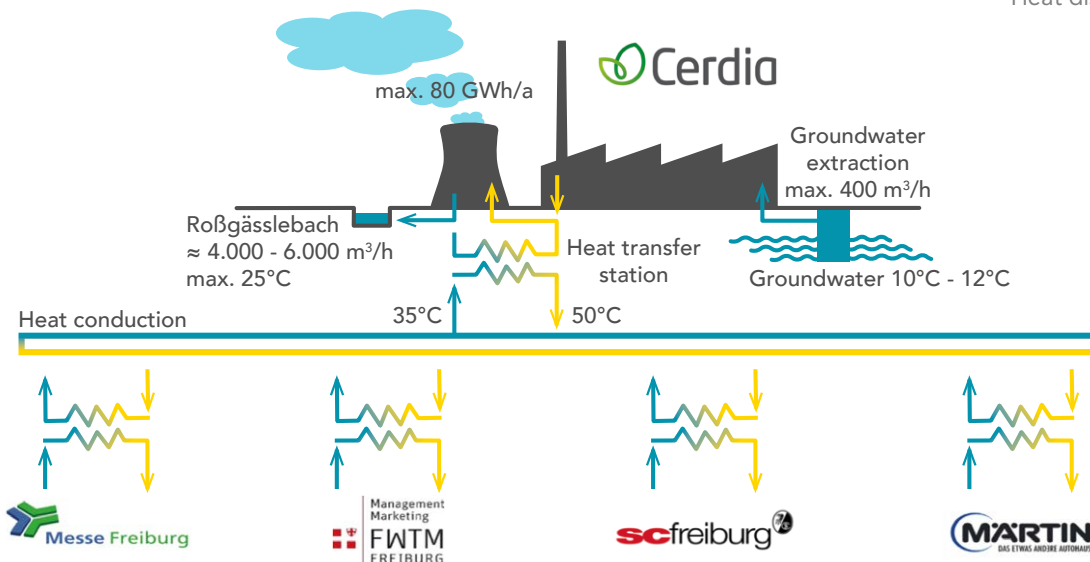
Locations of companies in the „Green Industry Parks“

be cooled down to 30 degrees before it could be released into a creek. Now the water arrives at the buildings at around 48 degrees, which provides sufficient heat for the rooms in newly constructed buildings. A car dealership already receives heat for its new structure. The new office complex of the FWTM at the fairgrounds, the fairgrounds as such and the new building of the Fraunhofer Insti-

tute for Physical Measuring Technology are customers as well.

The new soccer stadium of the SC Freiburg is slated to be added in the future. Its lawn heater consumes a lot of energy. Given that the stadium is also equipped with a large photovoltaic system, it aims to become Germany's first climate neutral stadium.

Heat distribution model



With its “Green Industry Park” project, Freiburg was one of the winners of the “Climate Active Community 2018” contest, which was hosted by the German Federal Environmental Agency and the German Urban Institute.

Commercial zone Hochdorf is slated to follow the positive example starting in 2020.

Neighborhood climate protection

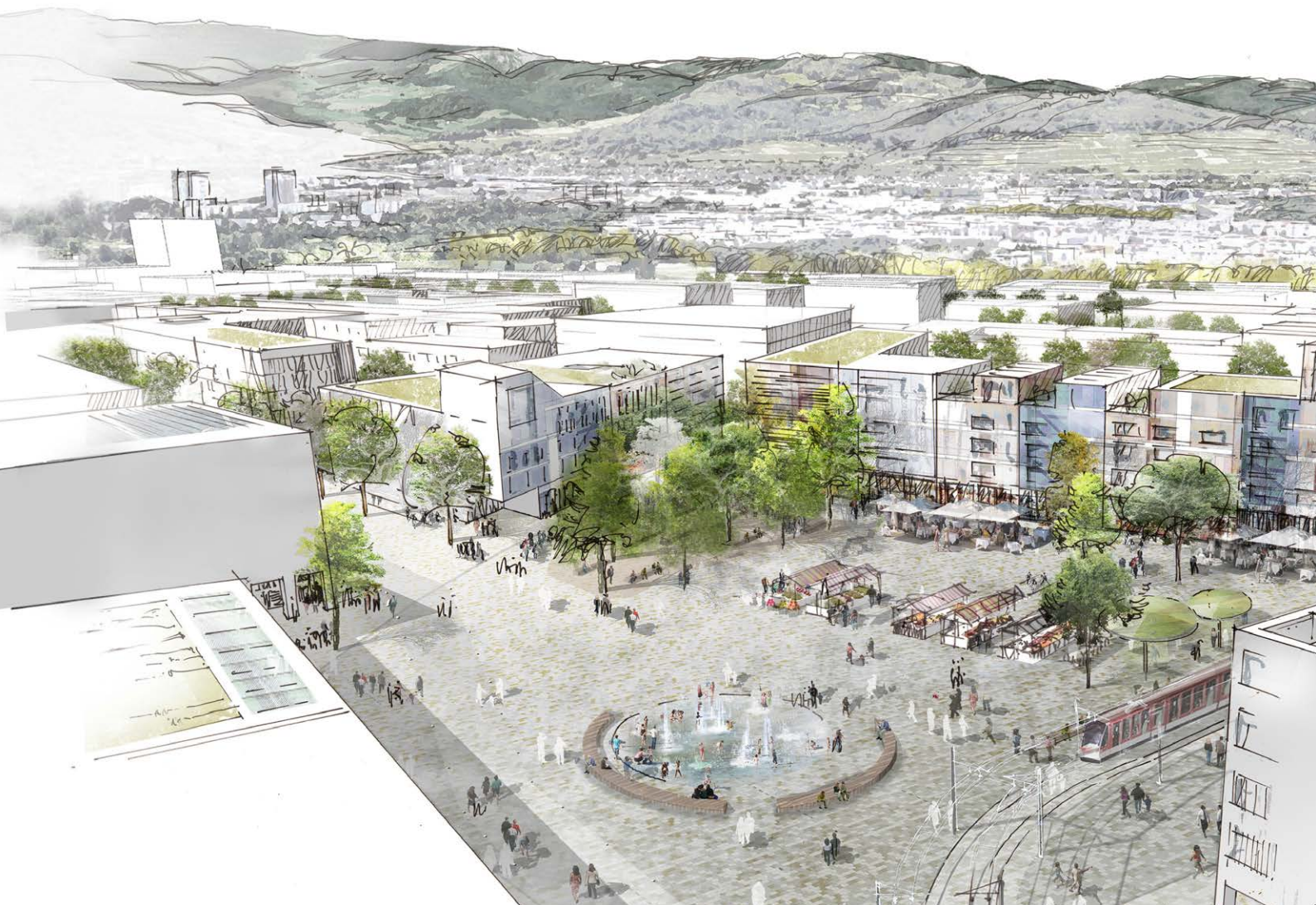
The City of Freiburg fosters and sponsors climate protection in its districts. Three neighborhood projects (Wiehre, Haslach and Kappel) have already been successfully implemented, two others are happening (climate quarter (“Unser Klimaquartier Waldsee” and the climate neutral district of Dietenbach). Residents in all locations played a major role. After all, climate protection depends on the engagement of all involved.

Depending on the existing buildings, the projects have different focal points based on the structure. In the Wiehre District, which boasts many buildings that are on the national register of historic places, the focus was on the expansion of decentralized heat-power coupling.

In the largest district, Haslach the reduction of building energy consumption was the primary issue. The city also had a district concept drawn up for Freiburg’s Kappel District, in the extreme southeast.

“Unser Klimaquartier Waldsee”

Along with the “im Waldsee” citizens, the city aims to develop integral solutions in a pilot district. To that end, climate protection and a future worth living in a livable town, go hand in hand. Many different players join the city in drafting up concepts for practical solutions aiming at permanently climate friend-



ly conduct and general conditions in the District of Waldsee. The project extends far beyond the building sector: in the action fields energy, mobility, nutrition, nature and consumption, vast potential for a climate friendly lifestyle is still waiting. The city offers know-how, networks, advice, coordination and, for especially innovative ideas, even financial incentives. The official project rollout will be in January 2021; the project will run for two years. The plan is for another district to profit from the experiences thereafter.

Climate neutral District of Dietenbach

Climate neutral, sustainable and efficient energy availability is planned for the new District of Dietenbach. With its close to 7,000 residential units, Dietenbach is slated to become the largest newly implemented quarter and to house 15,000 residents. Thanks to the use of regenerative energy, the new district in the western part of Freiburg will generate more low cost electricity and heat than it needs. Energy efficient building styles,

solar energy and environmental heat, for instance sewage heat, are the most important components. A mobility concept with a small environmental footprint complements the plan for a future ready urban quarter.

Energy caravans

Caravans move from place to place. In this case, they also bring along professionally founded energy advice. In 2019, the City of Freiburg launched the new energetic building renovation concept in Freiburg-Munzingen. Property owners are given the opportunity to obtain free advice on their concrete refurbishment options. The advice is customized for each building. It is product and provider neutral. Professional support was provided by the fesa e.V. and the Baden-Württemberg Consumer Center. More than 100 of the contacted homeowners took advantage of the free energy consultation offer in Freiburg-Munzingen. After this positive response and the record result, the energy caravan will remain in the Tuniberg Region for the time being with the aim of continuing to seize the energy conservation potential in private households in the towns of Freiburg-Tiengen, Freiburg-Waltershofen and Freiburg-Opfingen. The consulting campaign is also being scheduled for the District of Freiburg-Waldsee.

All sectors must contribute to climate protection

All sectors must contribute to be able to attain the climate protection goals: energy production and distribution, transportation, buildings, consumption and nutrition, as well as agriculture. In many fields, the City of Freiburg is only as flexible as the general federal and state provisions allow it. The concrete actions of the city and its plans for the future are everpresent in this brochure and we will return to the topic in the following chapters again and again.



1.2 Conservation of biodiversity

Maintaining and fostering biological diversity

Biodiversity comprises the full diversity of life on earth. It describes the wealth of habitats and species, their interactions with each other, i.e. also the diversity of all natural processes. Over the course of earth's history, biodiversity and its manifold species emerged. This is the result of evolution.

However, in the past centuries, biodiversity also increasingly manifested itself as the result of the interaction of cultivating humans and nature. The impact of humans was not just negative for biodiversity. In fact, examples of species rich meadows and pastures in human-controlled cultivated landscapes demonstrate this. However, the most recent Report of the World Biodiversity Council of 2019 shows how humans are putting their own foundations in jeopardy. For instance, the rates of global species perishing as a result of human activities are now a hundred times greater than on average in the past ten million years. At this time, more than a million species are at risk of becoming extinct.

This rapid loss of biological diversity in recent years is dramatic for a variety of reasons. On the one hand, biodiversity as such deserves protection. On the other hand, it is also essential for life, for the wellbeing and health of humans. For example, diverse species help people feed themselves and stay healthy by delivering raw materials for food or medications. The vaster the level of biodiversity, the more readily landscapes will adjust if the environmental conditions are changing. In times of climate change, this is an

important resource. Hence, the decline of biodiversity impairs the performance of ecosystems, such as the pollination of cultivated plants, the regulation of the water cycle, the provision of drinking water, soil development or the protection against avalanches and floods.

However, biodiversity also fosters the recovery of humans – it can make us happy and satisfied.

Action plan biodiversity – an innovative tool promoting biological diversity in the City of Freiburg

Very few metropolises have the diverse topography of Freiburg. The city's terrain spans from the low elevation at the foot of the Tuniberg of around 200 meters above sea level to the city's mountain, the Schauinsland, which stands 1,284 meters tall.

Thanks to this natural geography, but also thanks to the diversity of traditional cultivated landscapes – from mountain pastures to dry walls – the biological variety is comparatively high in the County of Freiburg. Assessments and observations have revealed the existence of close to 3,000 flora and fauna species in the county and more than 1,000 protected biotopes have been mapped.

To protect and develop this biological diversity, the municipality has and is implementing numerous measures. For instance, the City of Freiburg has been taking actions to strengthen the biotopes since the 1990s. In Freiburg, since 2010, through its communal species protection concept, it has been taking care of the preservation of target species in

the State of Baden-Württemberg. Moreover, Freiburg joined the "Kommunen für biologische Vielfalt e.V." as early as 2012. Participating municipalities undertake to actively work for the protection of biological diversity.

Impressed by the dramatic numbers arising from the 2017 Krefeld Study, which documented a decline of the biomass of flying insects by 75 percent and the Report of the World Biodiversity Council

(IPBES) published in 2019 in Paris, which documented the continued unstoppable extinction of species, Freiburg's town council passed new objectives aiming at the fostering of biological diversity and a biodiversity action plan in 2019.

The new goals of the City of Freiburg fostering biodiversity and in particular insect and bird populations through 2025, concentrate on eight different focal points:

BIODIVERSITY FOSTERING GOALS

- 1** Pesticide usage reduction and increase of the percentage of space dedicated to vastly blooming seam and fringe structures in agricultural zones
 - 2** Maintenance and development of premium ecological, structure rich open land as well as expansion of biotopes to the entire county
 - 3** Expansion of the percentage of space dedicated to nature conservation and landscape protection areas
 - 4** Upgrading of forest boundaries and increase of the percentage of leafy woods in the Stadtwald
 - 5** Increase of the percentage of nature proximate, structure rich running creek lines and water ditches
 - 6** Maintenance and development of nature proximate, richly blooming plant areas in settled parts of town through increased intensity and nature proximate design of green spaces, graveyards and green belts in the transportation infrastructure
 - 7** Improvement of nature proximate and species protecting designs of buildings and construction areas through the sponsoring and consultation of players involved in construction
 - 8** More intense publicity related to the preservation of biological diversity and increased implementation of activities with citizens
-

Based on these focal topics, the City of Freiburg has compiled 45 measures into a biodiversity action plan. Since 2019, it has been implementing these measures step by step with additional funds. Farmers working the municipal lease hold fields are required to reduce their pesticide uses and to upgrade the habitats in agriculture – an innovative and sustainable incentive program was developed in a partnership between the town administration, agricultural and environmental associations. Grazing ruminants also serve the care for landscapes, which is why an expansion of extensive grazing operations is desirable.

The city will also designate further nature proximate habitats as conservation zones, develop a biodiversity check for the municipal green and open air zones and upgrade the green zones in parks and in the transportation infrastructure. Ultimately, the goal is also to deploy systematic monitoring of the insect fauna and vegetation in the town limits.

Grape cultivation and biological diversity – Biotope Association Tuniberg

The Tuniberg on the western fringes of the city is an opposite pole to the high elevations of the Black Forest. It is considered one of the warmest and sunniest regions in Germany. It is more of a

mound than a mountain: it sits above the Rhine Valley at an elevation of no more than 120 meters. Thanks to its special climate and very specific geology, paired with the land use, habitats for characteristic and even rare animal and plant species could develop here. The area boasts dry-warm locations with lean grass and open rock formations, hollow loess pathways and dry walls.

By now, all vintners working the Tuniberg have converted to grape cultivation with a small environmental footprint. The cooperation with vintners resulted in a regionwide biotope plan. Since the mid 1990s, the town administration coordinates its ditch and hollow loess work as well as the work on steep faces, the development and networking of green land and meadow orchards as well as the care for and refurbishment of dry walls. As a result, it was able to stabilize the populations of stringently protected species, for instance that of the western green and the wall lizard or the smooth snake.

The living conditions for specifically protected bird species, such as the hoopoe, bee-eater, blackbird and red-backed shrike could also be improved. This is also true for numerous types of insects, which are on the red list, in particular wild bees and butterflies.

Vines on the Tuniberg



Conservation of biodiversity in natural town settings – important ecological support for people living in cities

More and more people around the world live in cities. Given this fact, settled urban areas play an important role in the preservation of biodiversity. Hence, a biodiversity check for urban open spaces is currently being compiled. In a complete urban overview, it will show what can help maintain and develop structure as well as species rich habitats. The biodiversity check also analyzes the options available to upgrade and promote biodiversity in the settled areas within the Freiburg city limits.

Conservation zones – important components of Freiburg's biodiversity strategy

A very important and effective measure to maintain biological diversity is the conservation of ecologically valuable parts of the natural and cultural landscape. Consequently, the City of Freiburg has been using this tool consistently over the years. Around 52 percent of the county is currently protected by the Nature and Forest Conservation Act. Given that this mosaic of protected areas consists of many different components – in other words conservation zone categories with different objectives – the areas overlap in some cases.

However, land conservation zones make up the biggest part of the cadastral district with around 46 percent. Next are flora-fauna-habitats with 21 percent and bird sanctuaries with 20 percent. The former two are also part of the Natura 2000 Network of the European Union. Nature conservation zones – the best known and strictest protection zone category – make up around 4.5 percent. The two large conservancy zones Naturpark Südschwarzwald and the Black Forest Biosphere Zone cover about 21 percent of

the county and protect the Black Forest's valleys and summits. Eight percent of the area are dedicated to open land biotopes. There are more than 100 natural monuments as well as protective forests, which cover about two percent and forest biotopes around six percent of the cadastral territory.

The City of Freiburg aims to close the remaining gaps in the nature conservancy network in conjunction with an action plan. This includes the planned designation of a nature conservancy zone in the Mooswald Valley to protect the last intact species rich heathland and wetland meadows as well as the natural ditches and flowing waterways.

Mountain fauna and flora – Nature preserve Schauinsland

A large portion of the municipal cadaster is covered by forests – 43 percent. About half of the woods are part of the large Black Forest nature scape. Here, in Freiburg's Stadtwald, on the slopes of the Schauinsland, is the city's largest nature preserve. It was designated in 2002 and is also part of the European protected land system Natura 2000. Besides the largely forested areas, about eight percent of the protected area consist of pastures. These are frequently so-called "Allmendweiden" (general use pastures), where farmers grazed and sometimes still graze their cattle together. The wind and pasture beech trees are hallmarks of the cultured landscape. These unique growth trees are the result of the interaction of violent winds that sometimes blow across the ridge and the bite-marks left by the pastured cattle. Now these characteristic trees are at risk since fewer and fewer farms engage in this unique form of pasturing. The slopes make it complex and therefore not lucrative. Today, more than 120 at risk fauna and flora species make the Schauinsland their home.



Unique to the biotope are the high mountain *Nardus* grasslands, which are now rare in Germany, because they only grow where pastures are managed naturally, i.e. without fertilizers. A few rare high mountain plant species grow here as well, such as the Swiss dandelion or wild alpine lettuce, which is actually part of the subalpine flora range.

More than half a million people visit the Schauinsland each year, which causes considerable erosion damage in the vicinity of the lookout tower on the summit. Hence, the Schauinsland nature preserve has implemented rules of conduct to create a balance between nature conservation and local recreation needs. Through targeted environmental education, the city promotes the needs of nature in the summit region: display markers and nature preserve rangers brief those who visit the peak; a clever routing concept guides them to make their excursion nature conservation friendly.

Stadtwald biodiversity

Freiburg's Stadtwald is being managed as a diverse, natural habitat, especially for local flora and fauna. The goal is to foster rare and especially protected species and biotopes while maintaining and improving the forest, location and culture historically typical habitat and species diversity of the Stadtwald. The conservation and creation of a rich mosaic of forests with very different structures are key: from intensively cared for leafy forests in locations with the respective biotope tradition to the protection of natural processes in compatible wood areas, where humans no longer interfere with the forest development.

As one of the first forest owning communities, the municipal forestry office developed a dead wood concept as early as 1996. It was implemented throughout

the entirety of the Stadtwald to do justice to nature and species conservation. Perished trunks and branches are certainly not dead – they offer habitats for many species.

A network of dead wood areas and smaller “stepping stones” safeguards essential habitats for birds, bats and a vast list of insects. Core habitats of species living in old and dead wood are thus preserved until they decay naturally. In aging existing woods, habitat trees offer caves to the black woodpecker. Rotten spots or other structures that are key to biodiversity are forming. Trees that remain standing on their own or in groups replace the naturally missing habitats in different places. This is a dynamic approach. With close to 40 cubic meters per hectare, Freiburg's Stadtwald boasts an extraordinary amount of deadwood (the average in Baden-Württemberg is around 30 m³/ha).

Manmade species diversity – Nature preserve “Freiburger Rieselfeld”

For close to one hundred years, the City of Freiburg “drizzled” its sewage into a large area to the west of town called the “Rieselfeld.” Meanwhile, in the open area, a spectrum ranging from water bound to heat seeking species developed.

Along with the decision to build a new district in the eastern part of the “Rieselfeld,” the city designated the western part as a nature preservative in 1995. Today, its size of 257 hectares make it the second largest nature preserve of the city, trailing the Schauinsland.

To maintain and further develop the “Rieselfeld” habitats, a biotope development concept for the area was compiled early-on. The importance of the western “Rieselfeld” for species protection is also evident in the fact that it was added to the European protected area



Rieselfeld nature
reserve

system Natura 2000. In cooperation with the Mundenhof, care for the biotopes is now provided by two agricultural operators. As a result, nature preserve "Freiburger Rieselfeld" is now a habitat mosaic of meadows, fields and pastures, dams on which fruit trees grow, hedges as well as water ditches and ponds.

In combination with the adjacent wetland forests, the nature preserve is particularly important for the protection of birds and insects.

Besides white storks, it is home to stone chats, whinchats or redbacked shrikes. The insect fauna also includes some unique species, such as the large copper and numerous rare dragonflies, such as the blue damselfly.

1.3 Freiburg's Climate and Species Protection Manifest

In 2019 and 2020, several German cities declared a climate emergency in response to increasing public pressure and specifically the "Fridays for Future" (FFF) movement. This demand was always closely affiliated with the quest to counteract the massive, unstoppable demise of species of the previous decades. Due to the disagreements over the term emergency in general and because of decades of climate and species protection advocacy, Freiburg decided against the declaration of an emergency.

New communal objectives in favor of species conservation had already been passed and action programs compiled in 2019: the "Climate Protection Concept Freiburg 2019" and the "Biodiversity Action Plan." Moreover, expressing its respect for the fundamental demands of the FFF Freiburg for the earlier attainment of climate neutrality in Freiburg and as a result of several discussions with these active groups, the environmental administration decided to have the

advancement of climate neutrality from 2050 to 2035 evaluated despite existing and ambitious resolutions.

The Eco Institute and the Heidelberg-based ifeu Institute were commissioned to perform the evaluation. The investigations confirmed that an even faster attainment of the goals on the communal level would be a political and societal challenge that would be almost impossible to handle. Back then, the climate decisions on the federal level ("Climate Protection Package of the Federal Government") unfortunately offered the municipalities little positive or supporting approaches. Nonetheless, the administration developed additional measures for implementation that go beyond the action programs.

As an alternative to the proclamation of a climate emergency, the majority of the town council passed a climate and species protection manifest with a catalog of concrete, farther-reaching actions.

Lizard at the old freight station



Freiburg's Climate and Species Protection Manifest

The combustion of fossil fuels and grave interventions into the eco systems around the globe have already caused climate change and a dramatic loss of biological diversity, the consequences of which are evident worldwide.

The current earth temperature increase by more than a degree Celsius causes rising sea levels that render coastal zones uninhabitable. Dry and hot periods in the summer cause droughts and melting glaciers put the water supply at risk. Currently, around the globe, one million additional species are close to extinction and the biomass of flying insects in Germany has dropped by 75 percent in 25 years. This never-before-seen decline of biodiversity in human history and the changing general climatic conditions, ultimately destroy the foundation of life for all species.

For decades, the City of Freiburg has been actively countering these developments. By cutting CO₂ emissions by 37.2 percent per capita compared to 1992, the designation of large protected areas for nature and landscape; sustainable, nature proximate certified forestry in compliance with the Forest Stewardship

Council; the establishment of a climate protection fund and a large number of concrete climate and species protection projects with model character document the communal engagement in the field. With its climate protection resolution of 2019 and the 90 detailed measures, the city targets the reduction of CO₂ emissions by 60 percent by 2030 and the attainment of climate neutrality by 2050.

Its decisions to foster biological diversity in 2018 and the Biodiversity Action Plan of 2019 resulted in the passing of an action program and concrete goals to achieve a trend turnaround in species losses in the years to come.

Nevertheless, Freiburg is deeply concerned about the dramatic situation and acknowledges the mitigation of climate change and the demise of species as its key action assignments. It focuses all of its decisions on the attainment of these objectives. At the same time, it is aware of the fact that it will have to depend on the general statutory provisions enacted by the European Union, the German federal government and the state governments to ensure effective species and climate protection.

The town council of the City of Freiburg

... Realizes that the measures implemented to date on the communal, national and international level still do not suffice to limit the temperature increase of the earth to 1.5 degrees Celsius and to halt the massive die-off of species.

... Declares that the restriction of the climate crisis and the massive die-off of species as well as the grave consequences are top priorities of its municipal responsibilities.

... Going forward, will take into account with every decision and business transaction the effects on the climate and the conservation of biological diversity. It will implement such measures with priority that mitigate climate change and the demise of species as well as their consequences.

... Demands that the municipal enterprises and investments also engage in climate and species protection and that they separately report to the town council on this engagement by the end of 2020.

... Demands that the issue of environmental justice is considered more in all environmental subject matters on the federal, state and communal level.

... Asks in particular the European Union, the Federal Republic of Germany and the State of Baden-Württemberg, but also other states and municipalities to

follow Freiburg's model and to promptly pass clear, ambitious measures and laws mitigating climate change and fostering biodiversity. This demand of the federal government and the EU in particular includes the introduction of an effective CO₂ tax, a faster exit from coal-based electricity, a significant increase of the expansion volume of renewable energies, progressive measures aiming at the expansion of alternative mobility systems, transportation switch to environmental alliance and railway, a climate protection oriented building energy law, the implementation of an ecological change in agriculture, the prohibition of pesticides that harm insects, the consistent limitation of space consumption, the implementation of a space-based biotope alliance system and the increase of the percentage of strictly protected areas.

... Appeals to the citizens of Freiburg to continue their climate protection and biodiversity maintenance efforts and to expand it within the scope of their possibilities. To that end, it supports the engagement of every individual or citizen for climate and nature friendly life-styles by offering information and targeted subsidy programs.

The structure of the other superior and strategic measures that are required to implement Freiburg's Climate and Species Protection Manifest is depicted in the brochure G-19/216 and its attachments.

1.4 Water and soil protection

Groundwater – invisible but essential to life

One of Europe's most important groundwater aquifers is located on the Upper Rhine. This means Freiburg is a blessed city, since it gives the town access to plenty of premium water at all times. However, this kind of treasure of nature also means commitment – the commitment to conserve water, to minimally pollute it and to purify it as much as possible before releasing it into the rivers.

The Upper Rhine groundwater is also fed by plentiful precipitation, which reaches up to 2,000 liters per square meter in the Black Forest. In the valley (for instance in Munzingen), on the other hand, they may reach an average of less than 700 liters. The water collects in the gravel underground of Freiburg Bay, where it is extracted for use. Regional water utility badenova holds water rights for twelve million (Ebnet) or 20 million cubic meters (Hausen) per annum for the two largest water extraction plants in Freiburg-Ebnet and Hausen an der Möhlin (district Bad Krozingen). However, badenova's overall extraction volume is considerably lower than the approved volumes. Other waterworks are located in Freiburg's districts of Kappel and Günterstal.

The progression of climate change impacts the groundwater. The effects of the extremely arid year 2018 on the groundwater were quickly evident. While, in the Dreisamtal, where the waterworks Ebnet are located, the average over many years totaled 1,000 liters of rain per square meter, only about 700 liters poured down in 2018. In the Rhine Valley in Hausen an der Möhlin, where an average of 700 to

800 liters of precipitation are anticipated, only close to 500 liters fell in 2018. If climate change, based on the projections for the southwest of Germany results in drier summers, this will also affect the water supply. In recent years, a few wells in the Black Forest already ran temporarily dry.

Hence, the careful management of precious water is urgently required. Water conservation efforts have reduced the consumption of drinking water in Germany considerably. While in the early 1990s, it was still 150 liters per capita daily, the per capita consumption has been stagnating at 120 liters on drinking water a day since 2007.

The reasons: technical progress, e.g. water conserving household appliances and the increased awareness of the value of drinking water as a resource. Freiburg is taking lead role with strikingly low daily consumption figures. Albeit Freiburg is not a typical industrial locale, more than half of the groundwater pumped from the Freiburg Bay is used in town.

To conserve resources that are becoming scarcer as a result of climate change, the city is investigating possibilities to conserve water and to support the development of new groundwater through structural concepts. In the 1970s, the intense extraction of water resulted in a drop of the groundwater levels. This had an adverse effect on the vast moss woods used as local recreation areas. To stop the drop of groundwater levels, the water management agency now approves groundwater extraction in town and in the Freiburg Bay only subject to



River Dreisam

severe restrictions. Important factors for the maintenance of water reserves are the forests in town, which retain large amounts of water thanks to their vegetation and soil formats.

They filter and allow the water to slowly reenter the groundwater and surface water. For this reason, it is the goal of Freiburg's Forest Convention to manage a stable and stress resistant Stadtwald, which is also a determining factor from the water management perspective. A total of 556 hectares and thus eleven percent of the entire Stadtwald are located in the immediate proximity of drinking water sources for the town. Hence, they have been designed as water protection forests.

Maintaining the natural cycle of water – Priority rainwater infiltration basin

If rainwater lands on sealed surfaces, it quickly drains into the sewage and neither benefits the vegetation nor the groundwater.

Hence, areas were created all over the City of Freiburg that allow the rainwater to leach. Not sealing, or better yet, unsealing surfaces that are already sealed, are key approaches. Contrary to past de-

watering concepts, the focus now is on seepage and evaporation. Freiburg's rainwater fee supports these efforts: it is billed on the basis to the surfaces connected to sewage. If the surfaces are only partially sealed, reductions are usually granted.

Landowners can reduce their fees by decentrally leaching rainwater on their land. Rainwater infiltration basin at the highest level is very important for the region: pollutants are filtered out of water that passes through the alive and grass covered topsoil. If it reaches lower layers, the local groundwater development is increased, while it unburdens the above ground waterways and mixed water channels.

Groundwater protection can hardly be any more effective than the results achieved by unsealing and increasing seepage. That is why the concept has been a standard in Freiburg's new construction zones for many years, for instance in the Vauban and Rieselfeld districts or the new fairgrounds. The benefits are actually doubled: the more surface area is available for seepage, the lower the risk of flooding during strong rainfall. Unsealed surfaces also offer



Rainwater infiltration basin in the Oberwiehre

other advantages and are so-called no-regret measures – preventative strategies that make sense under economic, ecological and social aspects. Besides protecting the ground water, green zone seepage also counteracts overheating in the summer and creates a positive ambience when compared to sealed surfaces.

The fact that targeted groundwater enrichment measures work is evident in the moss forest areas, where the groundwater conditions have partially already close to reached previous values. This has had a positive impact on flora and fauna, although the groundwater level of pre-1970 has not yet been reached in some areas.

Protecting groundwater – safeguarding water quality

In recent decades, it became evident that clean surface waters and a protective coverage layer above the groundwater are not always sufficient to ensure good quality groundwater. The reasons are manifold: Industry, businesses and households impose burdens in some areas, if poisons that have not been properly disposed of (e.g. medications) make

their way into the groundwater. However, large scale influx from intense agriculture is the main problem. This is a major challenge for Freiburg and the region, since the city is sitting on particularly porous soil. At the same time, the area has a lot of farming. This results in nitrate and pesticide residues that may enter the groundwater.

To mitigate these effects, regional water utility badenova and the town administration are pointing out the importance of reducing the use of nitrate containing fertilizers and pesticides to the surrounding communities and agriculture. There is still a lot of work to be done in Freiburg. Hence, preventative water protection is the top priority at badenova. The utility sees itself as a “water protector.”

This also means that it briefs the public on the dangers and risks for the groundwater. One example is that improperly disposed of medications may enter the water cycle through the sewage and water purification plant and may thus also end up in the drinking water. The public relations campaign was accompanied by a research project:

The Institute for Environmental Medicine and Hospital Hygiene at Freiburg's University Clinic investigated the risk potential for the ground water caused by toilet flushing medication disposal. Comprehensive water protection comprises a number of responsibilities. In Freiburg, besides the Municipal Environmental Protection Office, other institutions are involved: City Dewatering, a separate organization, is responsible for the disposal of sewage and the operation of flood retention pools. Sewage association Breisgauer Bucht is in charge of sewage in the region. It is a public law based corporation, which is composed of the City of Freiburg and 28 other cities and communities. badenova secures the drinking water supply and thus partially protects the groundwater. It also monitors the water protection areas.

The State of Baden-Württemberg ensures the structural maintenance and flood protection for the Dreisam as a first rate waterway. Lastly, Freiburg's Garden and Civil Construction Office is responsible for keeping smaller waterways in good condition.

High recreational value, good water quality – manmade lakes

The extraction of gravel around Freiburg has left behind for the benefit of citizens some manmade lakes that offer high recreational value today: swimming, inflatable boat rides, tanning and letting go.

Unlike natural lakes, most manmade lakes neither have surface inflow nor outflow – their water level is fed exclusively by groundwater. However, less and less groundwater flows through these lakes over the year, so that nutrients frequently settle. They are brought in by waterfowl, swimmers, precipitation, direct inflow from the banks or dropping leaves. Hence, it is necessary to test the water quality at regular intervals. Freiburg's seven manmade lakes do very well, as the State Institute for the Environment Baden-Württemberg (LUBW) determined in its most recent assessment in the summer of 2018. The large and the small Opfinger See, the Moosweiher, Flückigersee, Tunisee, Silbersee and Dietenbachsee all received three stars in compliance with the EU Bathing Water Guideline.

Opfinger lake





Soil – a precious resource

Soils are the exterior most shell of our planet. They provide the foundation of life for plants and thus, directly or indirectly, for animals and humans. Good soil has a variety of functions: It is the prerequisite for clean water, delivers nutrients and raw materials, stores and filters water and can reduce pollutants.

However, it is a limited resource: it develops over long geological time frames based on matter that breaks down. It can be irreparably destroyed in minutes as a result of improper handling. Hence, comprehensive, systematic and preventative soil protection is indispensable. In previous decades, the need for soil protection has been increasingly acknowledged and implemented. Baden-Württemberg was the first German state to pass a respective state law in 1991. It also established its own soil protection administration.

Since the federal soil protection act went into effect on March 17, 1998, comprehensive federal protections of the soil have also been in place. Soil protection aims primarily at the balancing of the diverse interests in the usage of soil, at defending against soil and groundwater damages and at the prevention of long term dangers and risks.

Natural soil exists especially in forests. Freiburg possesses a wealth of them: 40 percent of the cadaster district are covered by forests. In 1999, Freiburg operated the first forestry in Baden-Württemberg that was certified pursuant to the Forest Stewardship Council (FSC) for its particularly sustainable forest management. This means that it is no longer permitted to drive heavy equipment of forest soil so that it can be kept in good and minimally condensed condition.

In addition, the forestry office declared 321 hectares in particularly sensitive areas, such as steep slopes or areas with sensitive topsoil, as soil protection forests. The natural soil functions must also be assessed in conjunction with structural measures. They have to be aligned accordingly, to ensure the careful handling of the limited resource soil. The recycling of terrain previously used by the military or businesses in Freiburg made room for new residential developments. As a result, new districts, such as Vauban and Rieselfeld were created. The former freight station North is currently being transformed into an attractive new residential and business location.

With its "Freiburg Region Soil Condition Report," Freiburg's town administration evaluated the soil as early as 2004. The report documents existing and current contaminants in the soil and groundwater, but also the risks caused by acidity, erosion and the use of space. Based on this, the town administration is in a position to identify areas with sensitive and polluted soil and to give its users and owners recommendations for the management of soil contamination risks and dangers.

Necessary soil testing – the management of existing pollution

In the county, the City of Freiburg has been conducting evaluations of spaces suspected to have existing contamination. Regular follow-up inspections update the data.

However, the term "existing contaminants" is used vastly. It refers to decommissioned waste management systems just as readily as to land of closed industrial operations, which handled materials that are hazardous for the environment. Unique issues in Freiburg are existing contaminants left behind by mining

operations on the fringes of the Black Forest.

The competent agencies – in Freiburg the Environmental Protection Office – investigate such areas. If existing contamination is present, the agency initiates measures to secure and refurbish them. Both, current damages and existing contaminants that were unknown to date make it necessary to notify the Environmental Protection Office, which then decides what steps to take.

The Environmental Protection Office has registered, processed and evaluated about 2,000 land parcels and is now assessing them systematically in accordance with a step-by-step program mandated by the State of Baden-Württemberg.

The gathered data provide landowners, planners and other interested parties with pertinent information. A large portion of the assessed areas (1,894 total) has already been examined and removed from active monitoring. A total of 107 are still being examined, monitored or refurbished. The refurbishment of 73 areas has been completed.

Regular soil sample updates in the County of Freiburg



1.5 Air pollution control

Freiburg's air – Carbon monoxide is still a problem

Air quality is an important topic in all big cities, including Freiburg. Because of the surrounding mountains, automotive travel is often dense.

Especially in the winter, when inversion weather dominates, which minimizes the air exchange with the surrounding areas, the statutory limits can sometimes hardly be complied with. The city has been working to resolve this issue for many years. Effective January 1, 2010, the driving ban for vehicles in the newly created contaminant group 1 was implemented. Since January 2012, vehicles in contaminant group 2 are no longer allowed to drive into the "Freiburg Environmental Zone."

The B 31 was initially exempted from driving bans. Now, the particulate matter pollution in Freiburg is significantly below the limit. The emissions of nitrogen dioxide (NO₂) currently no longer exceed the permitted limit on the traffic measuring station Schwarzwaldstraße. In 2018, the City of Freiburg had its air purity plan updated once again. By the end of 2015, the Regional Council Freiburg had initiated the process.

Hence, the third update was ushered in. Its goal is to comply with all emission limits as soon as possible and to thus permanently guarantee the protection of the affected residents from excessive NO₂ levels. Driving bans for diesel cars are the last resource to be deployed in the Freiburg air purity plan and only in the event that compliance with the NO₂ emissions limit – contrary to expectations – cannot

be attained in the long run. Freiburg currently has two measuring stations to determine air pollution levels – one on the Schwarzwaldstraße and one by the new city hall. The readings fluctuate not only depending on motor traffic, but also because of the weather. A wide range of accompanying measures aim at bringing down pollutant levels. More green zones in the city and even more traffic diversion in favor of public transportation or bicycle rides are some examples.

The management of parking space also targets the reduction of motorized traffic and is supported by publicity and city logistics for deliveries. Obviously, pollutant values can also be improved by the deployment of low or no emissions vehicles (electric drive). The efforts of the City of Freiburg with regard to air purity largely go hand in hand with the local climate protection activities.

Ozone is still an issue

The ozone pollution of the air we breathe, especially in the summer, has been a major issue since the 1980s. In times of high solar radiation in the summer, the gas develops from the oxygen in the air, the automotive carbon monoxide and easily evaporating hydrocarbons.

In 1990, Freiburg was Germany's first city to warn residents as soon as the ozone concentration exceeded a critical value. Starting at around 180 micrograms of ozone per cubic meter of air, it is considered potentially harmful to humans and the environment. Nowadays, in the spring and summer, the residents have the option to get information on the latest ozone pollution, peak values and any

ozone warnings on the ozone phoneline. While there are indications that the high peak concentrations are declining in the summer as a result of the reduction of hydrocarbon emissions, the city is unable to offer a fundamental solution for this recurring problem that persists through the years. This can only be achieved on the national or European level.



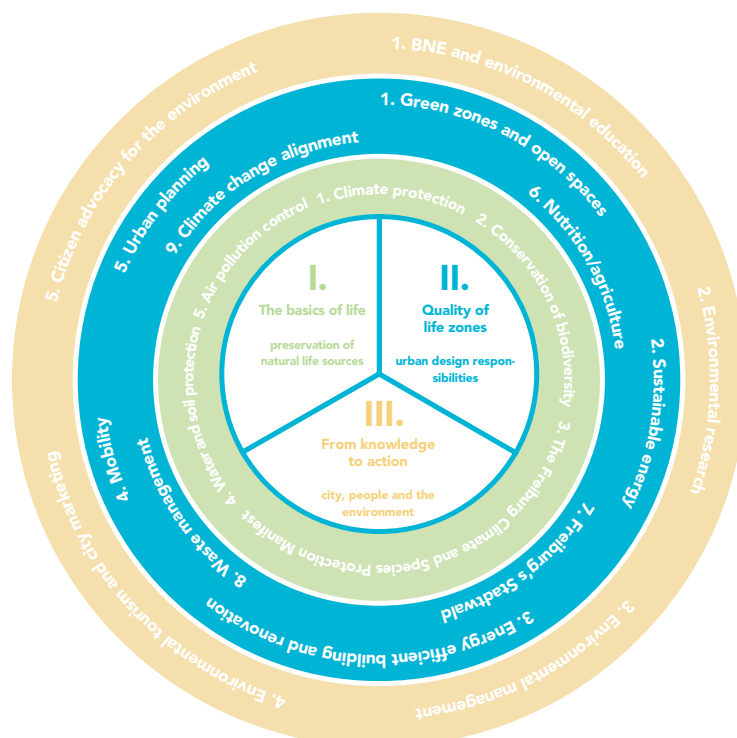


QUALITY OF LIFE ZONES

**Urban design
responsibilities**

II.

1. Green zones and open spaces
2. Sustainable energy
3. Energy efficient building and renovation
4. Mobility
5. Urban planning
6. Nutrition/agriculture
7. Freiburg's Stadtwald
8. Waste management
9. Climate change alignment



2.1 Green zones and open spaces



Seepark

A lasting benefit for the city – the former State Garden Exhibit grounds

Local recreation, improvement of the climate in town, environmental and climate protection – green open areas meet a lot of functions in a city. Freiburg’s probably best known green zone is the local recreation area Flückigersee, which covers around 35 hectares.

In the past, it was a gravel pit. However, as the city grew to the west, the terrain was soon in the immediate proximity of town. Freiburg seized the opportunity to develop the area into an attractive green zone by hosting the State Garden Exhibit there in 1986. Attracting more than two million visitors, the event is still considered one of Baden-Württemberg’s most successful garden shows.

The Dietenbachpark, boasting 40 hectares, is even a bit larger than the park on the Flückigersee. It sits on the boundaries of the Weingarten district and also offers access to a man-made lake. In downtown, the three-hectare Stadtgar-

ten is one of the green dots, followed by the slightly smaller Colombipark, which is just going through a conversion. There are also the Stühlinger Kirchplatz, the Eschholzpark, the Botanic Garden and the Old Cemetery.

Green zones also play an important role outside of the city center. About 22,000 trees line Freiburg’s streets and city tram lines. A total of 350 to 400 trees are planted every year.

The Garden and Civil Engineering Office makes sure that it chooses only indigenous species of trees and bushes. It manages the green zones intensively or extensively depending on their uses, but always without deploying pesticides.

In compliance with ecological aspects, the grassy strips alongside creeks are mowed only in sections and alternatingly to ensure the animals that live there are not suddenly deprived of food. Green zones were included in the planning of the new Rieselfeld and Vauban districts from the start, while existing trees could in some cases be integrated into urban planning.

The two-hectare “Green Wedge” and the Center Ditch were created in the Rieselfeld District. In Vauban, five green zones between the rows of houses dominate the appearance of the quarter.

The fundamental principle of merging open spaces and buildings was anchored in the City of Freiburg’s “2030 Perspectives Plan.” The development of green areas to move in is given a lot of attention when it comes to growing

urban density and in the large new Dietenbach District. Two large parks and additional open spaces are planned for Dietenbach.

The Mundenhof

The Mundenhof, a former municipal farm, is now the most popular recreational facility in Freiburg. It is an animal and nature adventure park. It is based on the concept of presenting domestic animals and pets in species-adequate settings.

In partnership with experts, care is provided for the specific needs of the Cameroon sheep, the Hungarian boar, the horned heath, lama and many others. In recent years, the number of visitors has continuously grown and now reach close to 400,000 children and adults per annum. Young families show the biggest interest.

Visitors use the Mundenhof in many different ways. Some come for pure recreation, others to jog and ride their bikes. It also serves as a playground with an animal world backdrop. Some people embark on long full-day excursions, enjoy the peaceful ambiance away from the city or attend one of the many festivals. Ultimately, the Mundenhof is also an educational site, for instance in

conjunction with guided tours or nature pedagogic educational program KonTiKi (contact-animal-child).

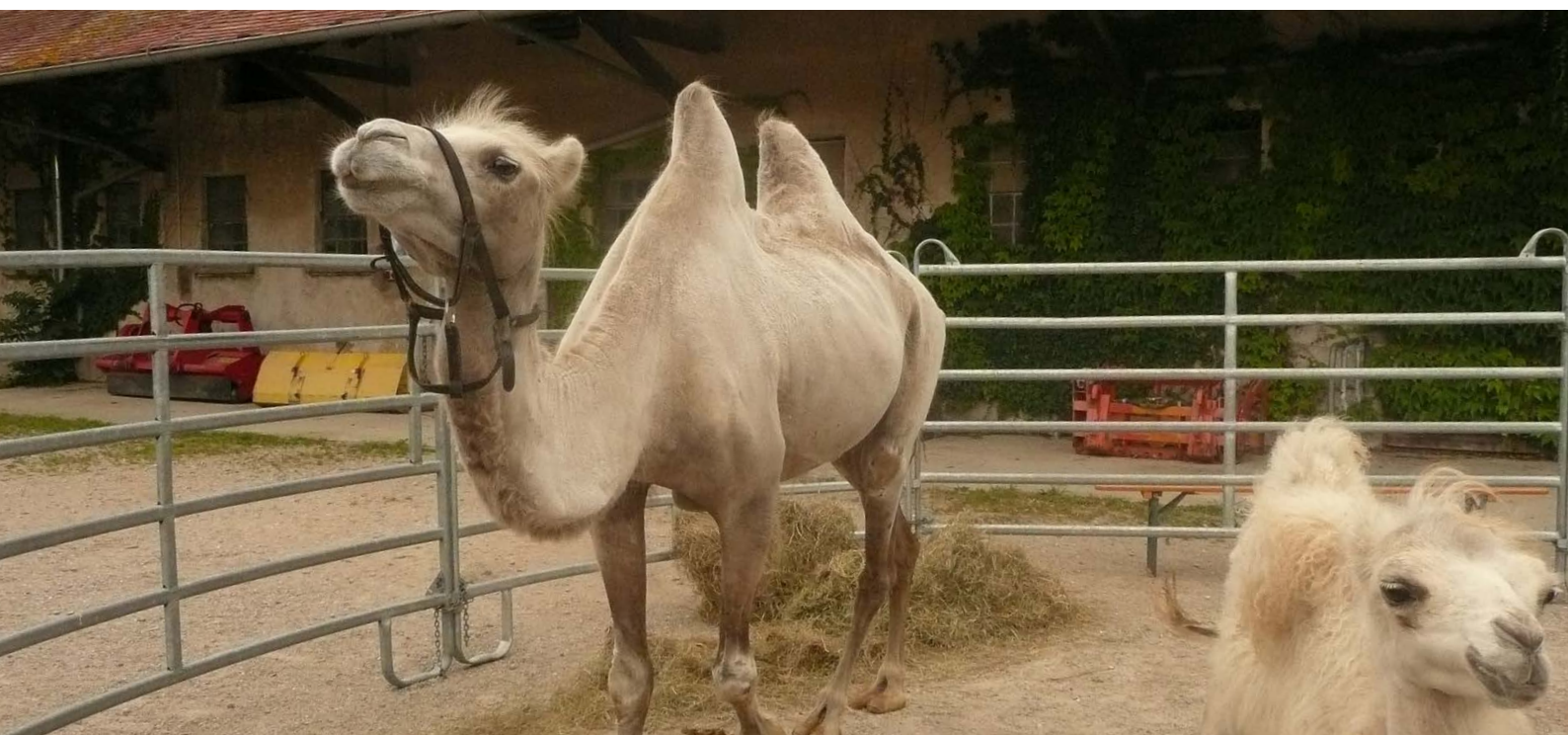
With its three units – animal sanctuary, green zones including nature conservatories and KonTiKi, the Mundenhof offers all of its visitors the opportunity to experience “their” Mundenhof and to decide on the level of their visit intensity.

Action areas for children – playgrounds and ball fields

Children and adolescents need to move and places where they can experience themselves with all of their senses. Age appropriate playgrounds and ball fields are thus extremely important for their development.

Upon publication of the supra-regionally known Freiburg Childhood Study by Freiburg sociologist Baldo Blinkert in 1993, the City of Freiburg began to change its playgrounds for the first time in 1995. This did not only affect the layout, but also the idea conception process. The resulting concept is still being implemented and has been updated to the latest needs and developments. The focus is also on inclusion and inter-generational features. Freiburg currently boasts 151 playgrounds and 52 ball fields as well as amateur football fields.

Camels on the Mundenhof





Allotment

They are very popular and ensure great adventure and recreational enjoyment. As “green oases” in town they are indispensable components of the public green zones for the psychic, physical and social health of children, adolescents as well as adults.

Gardening in Freiburg

The expectations and wishes related to areas dedicated to gardening in Freiburg are as diverse as the people. The spectrum includes everything from small gardens to leased gardens and urban gardening in public green zones to agricultural vineyards and fields. About a quarter of Freiburg’s residents want to garden in town or nearby.

Hence, from 2016 through 2018, the City of Freiburg, in exchange with the different interest groups, came up with a new concept for the development of gardening uses in Freiburg. With the concept “Gardening in Freiburg,” it developed a strategy that safeguards and increases the number and diversity of gardening options in town. The central objective is to introduce new forms of gardening, areas and cooperative arrangements besides the existing small gardens, most of which are worth maintaining and to present exemplary draft solutions.

Interest exceeds availability – Small gardens

In densely populated areas, small gardens can provide personal interaction with nature and improve the quality of life. More than 3,500 small garden parcels exist in Freiburg now.

The Small Garden Administration at the Garden and Civil Engineering Office leases them directly to private individuals (about 410 temporary gardens) or indirectly via general leasing agreements to the thirteen small garden clubs in Freiburg (totaling around 3,110 permanent small gardens).

These traditional small gardens and others that are being managed by third parties (railway, postal services, university) make up around 55 percent and therefore the largest part of the about 200 hectares of land used for gardening in urban Freiburg. However, there is far more interest among residents than there are available gardens: based on the latest statistics, around 900 garden seekers have been registered who have applied for a small garden with the City of Freiburg and local clubs.

At the same time, Freiburg is a growing city, the expansion of which into the vi-

city is often limited by the topography, and needs space for the new construction of residences, which sometimes occurs at the expense of small gardens. Conflicts of interest are unavoidable.

The scarcity of residences notwithstanding, the City of Freiburg strives to keep the existing small gardens intact, to further develop them and to use their spaces more effectively. The goal is to make hard to access small gardens more accessible, upgrade the public zones and to flexibly handle the size of the parcels. To achieve this, the cooperation with clubs and initiatives in bordering districts will be intensified.

Urban gardens and green zones on roofs – gardening options on roofs and in small areas

Urban gardens have existed in Freiburg's public zones since 2012. Unlike small gardens, engaged citizens jointly manage these areas. By now there are 21 projects handled by about 350 participants. Freiburg supports urban gardening on its green zones through the "Freiburg packt an" (Freiburg Does It) program. The plans call for the creation of additional gardens on residential and parking garage roofs. Besides the cultivation of vegetables and fruit, they are primarily individual recreation spaces and neighborhood meeting places.

Gardens on the roofs in Vauban



2.2 Sustainable energy

From the anti-nuclear-movement to energy supply concept

The energy political understanding in Freiburg and the entire region has been strongly impacted by the incidents in Wyhl, a vintner village 25 kilometers from Freiburg. When the state government planned to build a nuclear plant in the grassy Rhine valley, the vintners from the Kaiserstuhl occupied the construction field in February 1975 and were supported by many locals. This ushered in a new energy political approach in Freiburg, all of southern Baden and ultimately nationwide.

principles were defined and Freiburg's energy policies are still based on them: energy conservation, energy efficiency and renewable energies. Climate protection was added ten years later as a supreme energy policy goal.

Solar impulses from Freiburg

Freiburg has sent impulses that have moved renewable energies forward on the federal and international level since the 1980s. The Fraunhofer Institute for Solar Energy Systems ISE is a very important player in the field of applied solar research. It was established in 1982 and is now Europe's largest solar research facility.

Other companies from Freiburg that had an impact on and pushed solar energy forward, were the Solar-Fabrik as of the mid 1990s followed by the S.A.G. Solarstrom AG, which launched the first solar stock into the market in Germany. These and many other players developed numerous pilot projects and realized groundbreaking prototypes. Solar architect Rolf Disch built the "Heliotrope" at Freiburg's Schlierberg in 1994, which was not only the world's first plus energy building and produces far more energy than it consumes, but also a spectacular structure because it turns with the sun.

A few years later, in the immediate proximity, Disch built the solar settlement "am Schlierberg." This type of congruous neighborhood of plus energy houses was the only one in the world at the time. The EXPO 2000 project consists of 59 homes. Nine of them are exclusive penthouses on the roof of the office and commercial complex "Sonnenschiff."



Buttons for the nuclear phase-out

When a radioactive cloud passed through Southwest Germany in April 1986 from Chernobyl, the Freiburg town council made a decision that is still groundbreaking today: The town made the unanimous decision to quit nuclear energy. In October 1986, another unanimous ruling in favor of a future-oriented energy supply concept was passed. Hence, as early as the mid 1980s, three



Solar system on the roof of the City Hall in Stühlinger

With its total photovoltaic output of 445 kilowatts, the solar district produces around 420,000 kilowatt hours of solar power per annum. Previously, a special project had been completed by Freiburg's home mountain Schauinsland: the Rappenecker Hof, a hikers' restaurant at an elevation of 1,000 meters that dates back to the 17th century, became the first solar restaurant in Europe in the summer of 1987.

A total of 40 square meters of solar panels were installed on the roof and a battery stored excessive power for cloudy days. A diesel generator was only retained for emergencies.

The energy autonomous "Haus am Christaweg" is another solar project. It is a freestanding single family home offering 145 square meters of residential space. It was built as a research project of the Fraunhofer ISE in 1992. On its roof, 14 square meters of solar collectors produced hot water while 30 square meters of photovoltaic modules generated 4.2 kilowatts of electricity. Optimum insulation and a smart energy supply system made all other energy sources redundant. The building is now used as an office complex.

From exotic solution to important energy supply pillar

However, solar energy is not limited to pilot and research projects. Today, it makes annual contributions of 34 million kilowatt hours per annum to the energy supply. The City of Freiburg promotes the expansion of solar power energy through various programs.

Digital planning support for every building: Free Sun

The first question anyone who wants to install a solar system will ask is: Is my roof compatible? Hence, the City of Freiburg offers citizens an online decisionmaking tool under the name "Free Sun." It allows potential users to check out the suitability of their home. A map of the City of Freiburg provided online takes factors such as solar radiation per annum, roof space and orientation as well as shading into account for every single building. It calculates the potential yield.

"Free Sun" is based on aerial photographs generated by laser scanners. The data was compiled through the GIS (geographic information system) of the State of Baden-Württemberg.

The “Your Roof Can Do More” campaign!

Freiburg launched its “Your Roof Can Do More” campaign in May 2017. It explains the ecological and economic benefits of solar power production. The most important goal is to motivate Freiburg’s private homeowners to install their own photovoltaic systems. The project comprises a free initial consultation that provides first insights into the efficiency and feasibility as well as recommendations as to how building owners can optimally implement their PV projects. The campaign’s concept and design has been offered free of charge in all of Germany. Numerous cities and counties have since followed Freiburg’s example.



Cycling under solar panels

Climate protection meets climate change adaptation: the creation of additional space for the expansion of renewable energy, requires new, innovative ideas. In the future, the construction of a bicycle path roof made of semitransparent PV modules – a pilot project at Freiburg’s Fairgrounds – will not only add an interesting perspective to cycling, but al-

so produce more solar power for Freiburg. Every year, the around 300 meters long roof will relieve the environment of 150 tons CO₂. It protects cyclists and pedestrians from solar radiation on the highly exposed portion of the bicycle path. The development of transportation routes for the generation of renewable energy is a key future topic, given that the potential is limited to municipal properties.

Multi-level residential construction at a glance – the solar thermal initiative

Not only has the sun the capacity to deliver electrical power, it also provides heat. The potential of larger solar heating systems is particularly impressive when it comes to multi-family houses. About half of all apartments in Germany are located in such buildings.

Freiburg wants to do its part to better develop solar heat in multi-level residences. Consequently, it initiated a solar thermal demonstration project, sponsored by the badenova Innovation Fund and implemented by the Bauverein Breisgau eG in Freiburg. The project was completed in 2015 with assistance from the Fraunhofer Institute for Solar Energy Systems ISE.

The multi-family home complex of the Bauverein Breisgau at Emmendinger Straße 16 - 34 is the first and oldest building of the residential alliance. Ten multi-family homes offering a total of 92 apartments and 2 commercial units provide close to 5,000 square meters of residential and commercial space. They were built from 1903 – 1904 and are now on the register of historical places.

The new micro heating network consists of ten heat storage units, 76 flat collectors with a nominal thermal output of about 150 kilowatts (kWh), a combined heat and power plant with an electri-

cal output of 20 kilowatts (kWel) and 47 kilowatts of heat output (kWh). It also includes a gas fired peak load boiler. Moreover, each residence has a heat transfer station.

Heat management is provided by a decentralized control system. It is set up to ensure that solar heat is fed in with priority and consumed decentrally. Given that the combined heat and power plant is rather small, it can be operated under full load almost throughout the entire year. The generated electricity is offered to tenants by a subsidiary of the Bauverein for their own consumption.

In the summer months, solar power covers more than 60 percent of the power needed. More than 75 percent of the residents subscribe to tenant electricity. The combined heat and power plant supplies 71 percent of the power they consume. Now, Freiburg's solar thermal initiative aims to boost the popularity of the groundbreaking project and to initiate additional solar thermal projects in multi-family homes.

Still room for expansion in wind power

Freiburg is a privileged place under many aspects when it comes to the production potential of renewable energy. Besides the many hours of sunshine in southern Baden, the high elevations of the Black Forest yield large amounts of wind energy. Wind energy is indispensable for the energy revolution given that the space consumption for each generated kilowatt hour is so much smaller than it is with other regenerative energies.

Five wind power plants are currently located in the cadastral district of Freiburg. Two can be found on the Holzschlägermatte by the Schauinsland and three on the Rosskopf. Another by the Rosskopf is just behind the district bounda-



Wind turbines on the Rosskopf



ÖKOSTROMGRUPPE

Freiburg's Ökostromgruppe is an implementation partner for wind and water power as well as solar systems in the region. In the past three decades the enterprise has installed more than two dozen wind power plants, more than 100 solar systems and some water power plants in Freiburg and its surrounding counties.

Some of these projects were developed by joint subsidiaries of the Ökostromgruppe and badenova. The regiowind GmbH & Co. KG, for instance, operates Freiburg's wind turbines. They, in turn are owned by 490 limited partners, i.e. citizens.

ry on Gundelfingen territory. All of the systems in Freiburg date back to 2003 and generate a total of 10.8 million kilowatt hours per annum – about one percent of the city's electrical power needs. Current plans call for two new, larger systems on the Taubenkopf on the Schauinsland northside. They are supposed to produce as much power as all existing systems together.

Another option to boost the percentage of wind power would be what is called "repowering," i.e. the replacement of old with more efficient systems. Other key factors for the production of electricity using renewable sources are biomass and biogas.

Each year, they deliver 23 million kilowatt hours of energy that is not weather dependent. Thus, they provide the needed complementary power for wind and solar energy, which fluctuate. Moreover, through heat-power coupling, they deliver electricity as well as heat and thus minimize energy waste.

Small water power plants, which contribute about 1.5 million kilowatt hours of regenerative electricity are also part of the equation. Although water power is not completely autonomous from the overall

weather situation – and we saw this during the most recent hot summer – it still provides an easy to project, continuous source of energy and is indispensable for a supply safeguarding mix of renewable energy.

Household energy efficiency: Zuhause A+++

An energy revolution hinges on energy efficiency. The most climate friendly energy is the kind that consumes virtually nothing! Close to 30 percent of the overall energy consumption in Germany can be attributed to private households. Hence, this sector offers particularly high conservation opportunities. Consequently, Freiburg and the Consumer Center Baden-Württemberg have been offering free energy consultations to Freiburg's households for many years.

As a result, Freiburg's residents gain the know-how and competencies to conserve energy even more effectively at home, for instance by optimally heating and ventilating their homes. Owners and private landlords who are interested in energetic renovations also have at their disposal the building check of the Consumer Center. It is also free of charge thanks to support from the City of Freiburg.

Power saving check

The power saving check of the Freiburger Qualifizierungs- und Beschäftigungsgesellschaft mbH (f.q.b. gGmbH) and the Caritas Association Freiburg-City targets especially low income households. In this free electricity conservation consultation, advisors and households work on savings options for electricity, heat and water. They provide helpful consumer behavior advice. Not only is this easy on the wallet, it also contributes to climate protection. The project also comes with a social component, since the advisors are individuals who have been unemployed for extended periods of time. Once the power saving check is complete, every participating household receive instant assistance in the form of LED lamps, water conservation perlaters or switchable plug panels. As a special bonus, Freiburg funds the free replacement of refrigerators that consume a lot of power with appliances in energy efficiency class A+++. Since 2008, about 3,000 power saving checks have been completed and close to 1,000 refrigerators have been replaced.

Efficiency from the net: heat networks and power heat coupling (PHC)

The combined generation of electricity and heat, which is called power heat coupling (PHC), ensures the efficient use of fossil and biogenic fuels. To be able to use the generated heat to the fullest extent possible, heat networks are frequently required that transport the heat from the power plant to private and commercial customers. A concept for the expansion of remote heating systems has been in place since 2018. Whenever it is technically and economically expedient, decentralized networks in close proximity to each other are networked. Ultimately, the networks will be reinforced. This means that heat networks that have helped Freiburg efficiently use energy for a long time will become even more important.

A heating power plant can utilize five different gases

Freiburg has been betting on efficient and thus climate friendly technology for decades. The combined heat and power plant Landwasser has been supplying

The „power saving check“ determines potential savings in electricity, heat and water consumption



Freiburg's district of the same name with remote heat since 1990.

The plant, which is operated by communal energy utility badenova, has the capability of utilizing five different fuels – landfill gas, natural gas, biomethane, biogas and wood gas. The combined heat and power plant Landwasser produces around 35,000 megawatt hours of heat every year and distributes it across of remote heating network that spans 15 kilometers. The plant began by using landfill gas from the nearby municipal waste site Eichelbuck. However, the landfill was no longer used after 2003 so that the methane content declined over the years. The addition of other gases (natural gas, biomethane) via Freiburg's gas network filled the gap.

Next, the new waste plant in the industrial park for bio waste from all of Freiburg's households began operations and has since also delivered biogas to the Landwasser power plant. Since 2014, an innovative, pellet operated wood gas combined heat and power plant has been supplementing the system. It provides a heat output of up to 250 kilowatts and 190 kilowatts of electricity.

Weingarten, Rieselfeld, Vauban – Electricity and heat from combined heat and power plants

Freiburg now bets on combined heat and power plant in numerous other districts. Heating power plant Weingarten, through a remote heat network that spans 56 kilometers, is supplying its districts of Weingarten and Rieselfeld. It was subjected to a general overhaul in 2012. A heating power plant also delivers heat and electricity to Vauban. Initially it operated with a steam engine with a nominal output of 345 kilowatt. In 2011, it was replaced with a more powerful natural gas driven combined heat and power plant module with an output of 850 kilowatt. In 2014/2015, the remote heating network was further expanded by 2.5 kilometers in the direction of Merzhausen. The heat supply for the entire quarter, with the exception of passive solar homes, is provided by an energy center on the fringes of the neighborhood. This is the location of a combined heat and power plant which originally generated 60 to 70 percent of the quarter's annual heating needs via wood chip firing. In the interim, the heating center has been converted to natural or biogas. Wood chips still support the heat production process. They are stored



BADENOVA

Regional energy utility badenova was one of the forces that drove the expansion of wind energy in southern Baden. The enterprise is entirely owned by the municipality. Besides the city works association Thüga, the shareholders are about 100 municipalities, primarily from southern Baden. The City of Freiburg holds a 32.8 percent stake in the company.

In its Ecology and Sustainability Directives, badenova commits to a sustainably changed production and procurement mix – away from fossil and nuclear to regenerative energy sources. Other objectives are the decentralization of energy production through the consistent expansion of electricity-heat coupling in our region and intense efforts to increase the energy efficiency and reduce the energy consumption in all segments of private, commercial and public life.



Combined heat and power plant in the Uni-Carré

on site and burned in the boiler as needed. Respective updates now also guarantee that virtually all households in the quarter can be supplied with combined heat and power plant generated electricity. A provision in land parcel acquisition contracts requires all building owners to connect to the regional heat network.

Heatpower coupling does not even stop when it comes to culture. Since 1997, badenova subsidiary Wärmeplus has been operating a heating system in the basement of the City Theater in downtown Freiburg. Two biomethane operated combined heat and power plant modules with 350 kilowatts of electrical output have been installed there since 2005. They supply the City States, theater buildings, the adjacent movie theater, offices and commercial operations in the Bertoldstraße, the businesses and offices in the railway district as well as the Richard-Fehrenbach /Walter-Rathenau vocational schools with remote heat.

The town and climate activists in Freiburg have been discussing the replacement of climate damaging fuels with lower emission alternatives again and again. The continuously drive the matter forward. For instance, the heating

power plant of the university hospital reduced its combustion of coal as of 2011 and ultimately ceased its use completely. The operation now runs on natural gas in heat-power coupling and with biomass (industrial wood pellets). Freiburg's remote heating systems and decentralized combined heat and power plant prevent the emission of 68,000 tons of CO₂ and other greenhouse gases per annum compared to conventional fossil fuel heating cauldrons.

Geothermal solutions for the future

The use of deep geothermal sources principally offers the option to cover a significant percentage of Freiburg's heat consumption free of CO₂ and not from fossil sources, which helps attain Freiburg's climate protection goals. Given this fact, the City of Freiburg approved the compilation of a feasibility study on the use of deep geothermal sources in Freiburg's cadastral district by badenova/WÄRMEPLUS with funding from the city's climate protection fund. Freiburg is eager to openly verify the potential use of deep geothermal sources and to have a professional plan developed. The aim is to determine the potential and possible applications as well as to identify and assess the potential risks.

2.3 Energy efficient building and renovation

Extra efficiency mandatory for new construction

Buildings play an important role in climate protection. Hence, Freiburg has been betting on stricter energy efficiency standards than the ones imposed by the federal Energy Conservation Directive (EnEV) for new construction for many years. Especially in the districts of Rieselfeld and Vauban it became evident that the building style “Low Energy Houses in Freiburg” first introduced in 1992 and updated in 2005, was the way to go. As of 2009, Freiburg’s Efficiency House Standards 40 and 60 replaced the previous local Low Energy House Standard. In March 2012, they were consolidated into the Freiburg Efficiency House Standard 55 for residential buildings.

It mandatorily applies to all urban development contracts affiliated with zoning plans and to all purchase agreements for municipal residential land parcels. One important aspect is that the air tightness of the building must be document-

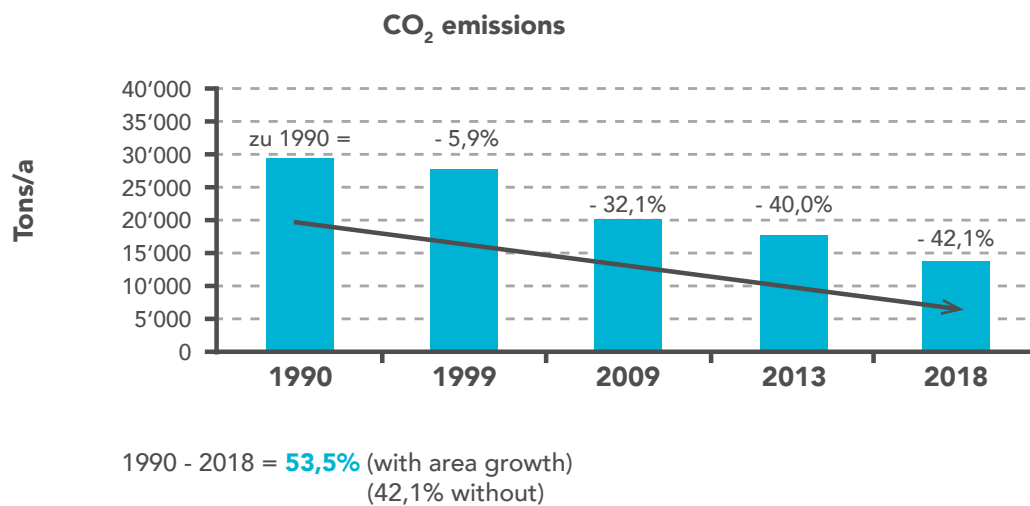
ed by way of the “Blower Door Test,” which is common practice for passive solar homes. The result must be equivalent to passive solar homes. This ensures that the building’s exterior is not only well insulated in the documentation, but also attains the positive values as a result of precise handling on the construction site. A ventilation system with heat recycling and an efficiency level of at least 75 percent is also mandatory.

Freiburg’s Efficiency House Standard 70 for buildings used primarily as offices and service locations was introduced simultaneously. This means that the annual primary energy needs of a new building must not exceed 70 percent of the computed values for a reference building pursuant to the EnEV. As of 2016, the EnEV raised the federal limit a bit over the previously valid EnEV 2009. However, Freiburg’s Efficiency House Standards are still stricter than these statutory provisions.

Passive house on Bugginger Street



CO₂ reduction in city buildings (excludes the City Hall in Stuehlinger)



Attainment of passive solar house standards – renovation of municipal buildings

While passive solar standards are already in effect for new construction projects, the energy efficiency of existing buildings is catching up step-by-step. Schools and municipal residences are being renovated on a high level up to passive solar house standards. Not only do these measures help climate protection, they also cut energy costs significantly over the decades. Building Management Freiburg (GMF), which manages the town's own buildings, i.e. schools, administrative buildings and kindergartens in the City of Freiburg, is also in charge of the energy management for this real estate. For the new construction or refurbishment of buildings, the Building Management Energy Guideline defines ambitious standards for energy conserving construction and efficient technology. It sets high bars for the energetically optimum operation and use of buildings. Since 1990, CO₂ emissions by municipal buildings have dropped 42.1 percent.

The Weiherhofschulen were the first in Freiburg to have their heating technology completely overhauled starting in 1998. In 2002, a new heating system was installed. The generated savings speak for themselves: the energy consump-

tion of the complex, which had totaled 2,089 megawatt hours in 1997 dropped by around 80 percent by 2013. The Wentzinger Schulen are another example. The complex by the Seepark, which dates back to the 1970s, was under renovation for seven years since 2009. As a result, the property attained passive solar standards and reduced its greenhouse gas emissions substantially. The children enjoy a comfortable room climate, which is guaranteed by an intelligent ventilation system with heat recycling.

In Ebnet, the newly constructed Feyel Elementary School in passive solar format replaced an old building. Compared to the old Feyel School, the new building consumes around 40 percent less heating energy. Although it is larger, the operating costs of the new school are significantly lower than those of the old Feyel School. The most ambitious school construction project in the city's history began in the early summer of 2019: the Staudinger Integrative School in the District of Haslach is under new construction for EUR 110 million. The construction work will continue at least through 2026. The new building will be passive solar and is expected to produce excess energy thanks to a photovoltaic system on the roof, making it a "plus energy school."

Urban development in Freiburg – the world’s first passive solar high rise renovation

In 2012, Freiburg’s Urban Development (FSB) converted the first high rise in the world in the District of Weingarten into a passive solar building. The 47 meter tall building dating back to 1968 was gutted to the core over eight and half years and renovated. This reduced the annual heat requirements from 68 to 15 kilowatt hours per square meter. Urban Development invested EUR 13.4 million into the project. Based on a definition developed by the Passive House Institute in Darmstadt, a passive solar building must not exceed 15 kilowatt hours per square meter and year for heating and cooling, i.e. the equivalent of about 1.5 liters of heating oil.

Hence, this type of building needs only a quarter of the energy of an average newly constructed one in Germany and less than one tenth of many old buildings. In the Bugginger Straße project of Weingarten, a heating power plant now delivers the minimal energy that is still required in the form of remote heat. A second passive high rise has been completed in Binzengrün – another renova-

tion of a tower dating back to the 1960s. Thanks to a structured construction process and the wealth of experience from the previous project, the FSB was able to shorten the construction time by four months to 13 months. The 105 tenants profit from the renovation thanks to an 80 percent drop in the overall energy consumption.

The FSB started another pilot project “am Schildacker” in 2019: 116 residences in 100 percent timber construction. For this four-floor project, the FSB anticipates investments of EUR 24 million. To date, this is Freiburg’s largest timber project. All of the timber is sourced in Germany, Austria and Switzerland.

Sustainability award for the “im Stühlinger” city hall

Freiburg’s new city hall received a coveted award in December 2018: The German Society for Sustainable Building and the Deutscher Nachhaltigkeitspreis e.V. Foundation lauded the ambitious new construction with the award “Sustainable Building.” The judges called the “im Stühlinger” city hall an “excellent example for the model character public buildings have in the implementa-



ENERGIEAGENTUR REGIO FREIBURG GMBH - UNTERSTÜTZUNG FÜR VORDENKER_INNEN

Energy agencies are important points of contact for building technology and energy supply related expertise. In 1999, Freiburg in partnership with the associations Klimaschutzpartner im Handwerk Regio Freiburg e.V. and fesa e.V. established the energy agency Regio Freiburg GmbH. It consults communities, city works, residential building developers and artisans in the use of energy conserving building technology, heat insulation and renewable energy. Moreover, it develops energy concepts and information campaigns. Thanks to its expertise, the energy agency Regio Freiburg also has earned a good reputation outside of the region.

tion of ecological and architectural standards." As the first public net plus energy building worldwide, it produces more energy over the course of the year than it needs for heating, cooling, ventilation and lighting. This can be achieved thanks to around 800 solar panels on the façade and on the roof. Surface proximate geothermal energy supplies the power for heating and cooling by using the warmth of the groundwater. The building's exterior attains passive house standards. Since the end of 2017, around 840 city employees work in the administrative building on the Fehrenbachallee.

More wood in the cabin – Freiburg launches a timber construction promoting program

Freiburg wants to considerably increase the uses of regrowing raw material wood in residential construction. In January 2020, it launched its own sponsoring program. Wood from regional sources is not only sustainable, it also makes an important contribution to climate protection. CO₂ that is stored in the wood remains there for a long time. At the same time, the material and its many uses, replaces raw material and energy intense building materials, such as steel or concrete. Innovative approaches now allow for the timber construction of multi-level residential properties.

The subsidy program is available for new timber construction that comprises at least four residential units, but also for annexes and added floors starting with the first newly created apartment. Besides funding, the town administration has set up an architects' office to drive the subject of timber further thanks to consulting, networking and promotion. A timber construction guide also provides detailed information on 29 groundbreaking timber building projects that have already been completed in the county.



City Hall Stühlinger

Another feature of the timber promotion is the presentation of a timber building award for particularly well executed projects to the public. The timber construction award will be bestowed for the first time in 2021.

All information, funding documents and consultations on timber construction can be found at the Beratungszentrum Bauen und Energie (BZBE) of the City of Freiburg or can be accessed at www.freiburg.de/bzbe. Telephone consulting on timber construction and the new subsidy program is also available.

Focus on energy efficiency and climate protection – Energy concepts for new construction zones in Freiburg

Particularly energy efficient buildings provide an important foundation for the attainment of municipal climate protection goals. The choice of a climate friendly heating system and the use of renewable energy are also key. Besides Freiburg's Efficiency House Standards for the new construction of buildings, Freiburg also takes into account factors in urban development planning. Hence, the zoning principles stipulate that a comprehensive energy supply concepts must be developed for each new construction zone.

2.4 Mobility

The city tram network – a rich past and a richer future

The connection between the citizens and their tram looks back on a long history. Along with the municipal electric works, it dates back to 1901. After many towns in the late 1960s and early 1970s reduced or completely decommissioned their tram networks to accommodate their vision of “car adequate cities,” which now seems rather strange, Freiburg soon rediscovered the “Bähnle.” In 1972, the town council decided to retain the tram and to expand it into a modern city train – a very progressive decision at the time. For Freiburg’s people, the tram has been an institution for decades and it is being further developed with pride. The routes once covered 14.2 and now span 43.9 kilometers.

Currently, 71 trams travel the rails. When new residential areas are developed, the tram is usually integrated from the start – for instance in the new Vauban District,

where Line 3 began operations in 2006. Another key tram project of recent times was the commissioning of the 1.9 kilometer route that runs across the Rotteckring in March 2019. Including the already necessary new construction of the Kronenbrücke, the project’s costs totaled around EUR 55 million.

Five years earlier, the city tram line, which ended in Zähringen at the time, was extended 1.8 kilometers to the Gundelfingen cadaster boundary. It was another huge project that took an investment of EUR 24.5 million to complete. Funding was provided under the Community Transportation Act (GVFG) by the federal and state government as well as by the association Regio-Nahverkehr Freiburg (ZRF) and the Freiburg Verkehrs AG (VAG).

These days, more than 80 percent of Freiburg’s residents live no more than 500 meters from the next city tram stop.

View from the Oberlindenbrunnen to the Schwabentor





With just 453 meters, the average distance between stops is extremely dense. Freiburg's individuals in charge recognized early-on that regional public transportation must be available quickly and to the general public to motivate people to make the switch. Moreover, tight schedule cycles as well as modern, handicapped accessible vehicles and stops make regional transportation an attractive option.

The system is complemented by city buses that cover 165.6 kilometers. The median distance between their stops is 634 meters. A total of 65 line buses are traveling the routes to deliver environmentally friendly mobility. Two electric buses were added to the fleet in February 2020 and the city plans to acquire 15 more. Public railways are not only being expanded within the city, but also in the environs. This has been going on consistently since the 1990s. The rail routes of the Breisgau-S-Bahn are being expanded and electrified in the Kaiserstuhl and in the Elztal, complimented by modernized stations and an expanded schedule.

The attractive monthly pass for the entire city and two counties

Freiburg became nationally known for its attractive monthly pass, which was introduced as the Freiburg Environmental Protection Card in 1984.

Now it is sold under the name RegioKarte because it is a regional network card valid for a month, which cannot only be used in Freiburg proper, but also in the adjacent counties Breisgau-Hochschwarzwald and Emmendingen. The success was determined by the budget price – but the RegioKarte is also transferable and on Sundays, two adults can embark on an excursion with up to four children.

As a result, people embrace the services of regional public transportation: in the most recent passenger survey in 2018, the VAG counted 81.3 million passengers who used its buses and trams. In 1984, at the time of the first Environmental Card, passenger numbers reached 29 million.



Schauinslandbahn

Climb to an elevation of 1,220 meters with the RPT

Freiburg's city transportation even climbs peaks – with the Schauinsland funicular. It was the world's first funicular that transported passengers based on the circular principle. It is still the longest of its kind in Germany today. Traveling over 3.6 kilometers, it surpasses an elevation difference of 746 meters and most recently transported 358,000 passengers per annum in its 37 cars to the peak of Freiburg's Schauinsland mountain. The summit station is located at an elevation of 1,219 meters, just slightly below the actual peak at 1,284 meters.

Bicycles are used for 34 percent of commuter travel

Besides its attractive public transportation options, Freiburg has long made a name for itself as a real town for cyclists. Freiburg's residents complete 34 percent of their in-town travel on bicycles, as evident from the latest Modal Split report of 2016. Pedestrians made up an impressive 29 percent, bus and railway users 16 percent. Only 21 percent used motorized

individual transportation (MIT) means.

The number of walking paths is strikingly high. Besides the density and diversity of stores, restaurants and historic buildings, especially downtown, this is due to the fact that residents consistently prefer to walk. Taking a look at the development of the share in mobility options, it is evident that the "environmental alliance" consisting of walking, bicycling and RPT has gained considerably in the past few decades, while motorized traffic shrank. In 1982, Freiburg's residents covered travel within the city as drivers and passengers at the rate of 39 percent. By 1999, the number had dropped to 32 percent.

Speed limits for cars are effective tools for the reduction of noise and pollution affecting residents. By now, Freiburg has implemented speed limits throughout, and even the main traffic arteries are included. In the town zones of the B 31, the speed limit is 30 km/h all day long. Despite the population growth and an overall rise in mobility, an entire bundle of measures made it possible to keep the absolute car travel numbers stable.

Active promotion of bicycle traffic

Intelligent transportation plans have fostered bicycle traffic in Freiburg for decades. The City of Freiburg compiled its first bicycle path plan in 1970. At the time, only just under 30 kilometers of bicycle paths existed. Today, the network has grown to 470 kilometers of bicycle friendly routes (230 kilometers of dedicated bicycle paths, 120 kilometers of forest and business routes and 130 kilometers of bicycle friendly streets with 30 km/h speed limits.

However, bicycles do not only need paths, they also require parking spaces. Hence, Freiburg has set up bicycle parking at important destination points – for instance downtown, in the hearts of the districts or at city tram stops. In downtown alone, there are now more than 7,000 bicycle parking stations.

Today, they are usually equipped with solid parking bows allowing for the secure lockage of even premium bikes. At the main station, the most important traffic hub in public regional and remote transportation, a bicycle parking garage for 1,000 bicycles has been open since September 1999 – the Bicycle Station. Many other public transportation stops also bet on Bike+Ride: more than

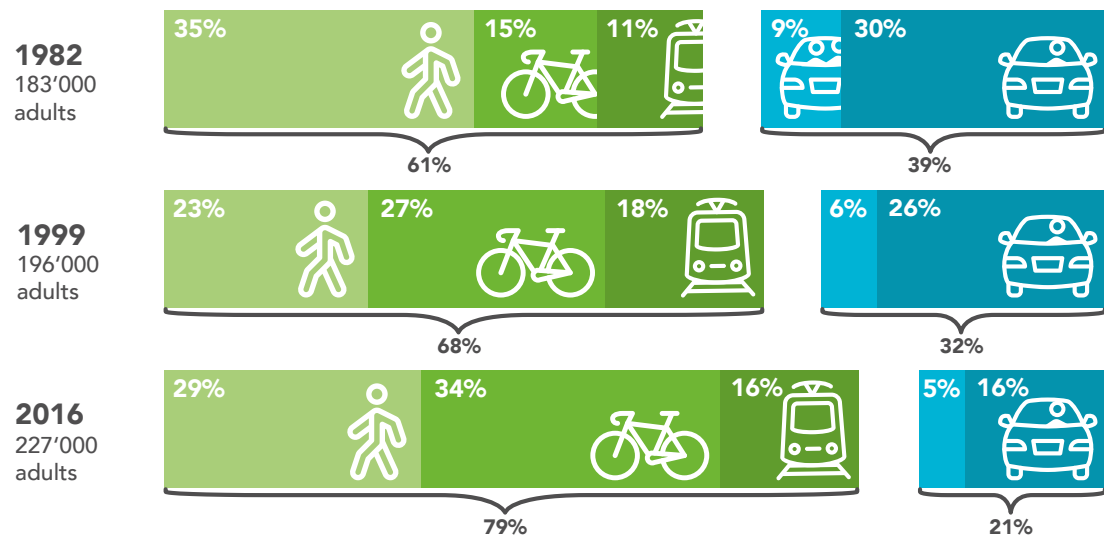
900 roofed bicycle parking spots can be found on 26 stops, while 44 more stops offer 1,000 uncovered parking spaces.

If you don't have a bicycle of your own, you can easily rent one in Freiburg. The VAG has been operating one of several of the bicycle rentals since May 2019 with an external service provider. At 55 stations across town, 400 rental bikes are available under the name Frelø, which can be borrowed after complimentary registration and can be returned at any random station. The promotion of bicycles in all of its facets is of course evident in traffic counts. Up to 18,000 bicycles cross the Blue Bridge across the railway tracks by the concert hall every day. A bicycle counter displays the latest daily count. Annually, more than three million cyclists pass this point and the numbers keep going up.

Leading role in the bicycle climate test

The good climate for bicycles was recently confirmed again by the survey of the Allgemeiner Deutschen Fahrrad-Club (ADFC). With its Bicycle Climate Test, the ADFC investigates in two-year-intervals how bicycle friendliness fares in Germany's cities and towns. Based on their everyday experiences, bicyclists rate the cycling policies in their respective cities.

Means of transport choice of the Freiburg resident population in domestic traffic



In 2018, Freiburg landed in third place in Germany among large cities of 200,000 to 500,000 residents. Freiburg did particularly well under the aspects of accessibility of downtown for bicyclists, infrastructure and expeditious cycling. One-way-streets that open up the opposite side of the street for cyclists and a good signage system also earned good ratings. Progress continues: with its “Bicycle Traffic Concept Freiburg 2020,” which was passed by the town council in April 2013, Freiburg intends to further increase the percentage of bicycles and at the same time dramatically reduce the number of bicycle accidents.

Another 170 projects for cyclists

The most recent bicycle traffic concept developed by the Garden and Civil Engineering Office with the assistance of town council members, the cycling associations and law enforcement, lists around 170 projects. Besides major conversions and new construction projects, they also include smaller ones, as well as right of way rules or the designation of additional cycling paths aiming to make the side street network even more bicycle friendly.

The focus of the bicycle concept is on the expansion/construction of new bicycle priority routes. The aim is to make safe and comfortable cycling possible on the main routes without deviations and also across longer distances. On the one hand, this is evident in the extreme quality of the routes. However, even more critical for the minimal delays in cycling mobility is the consistent “right of way” vis-à-vis crossing traffic.

Separate cycling paths (e.g. on the Dreisamufer bicycle path FR1) thus should encounter as few crossings as possible. On cycling paths or strips on main traffic routes (e.g. the Eschholzstraße), the traffic light cycles are coordinated with bi-

cycle traffic and in side streets, cycling routes enjoy the right of way (for instance in the Hindenburgstraße).

Sharing cars reduces the need for parking – Freiburg promotes carsharing

Carsharing has established itself as an attractive alternative to owning a personal car for millions of Germans. Affected cities also find it attractive because the joint use of vehicles means fewer cars parked in the streets. The number of car rides is simultaneously reduced, because carsharing members use the cars more consciously. Hence, carsharing helps attain the municipal goals of reduced automotive traffic and CO₂ emissions.

Carsharing also introduces a positive social component: areas that enjoy carsharing services allow residents to save the high fixed costs of a personal car and thus to reduce the urban cost of living.

Parking concept for shared cars

To foster carsharing, Freiburg developed a carsharing parking space concept as early as 2015. It reserves fixed spots on public roadways for shared cars. Previously, a lack of parking spaces was the primary obstacle for an expansion of the service. Freiburg’s first public car-sharing station opened in July 2015 at the Wilhelmstraße under the auspices of the State Transportation Minister. Since then, two each vehicles of the two Freiburg providers are parked there.

All over town, Freiburg now offers 76 carsharing stations with 217 cars. Hence, a lot of the urban areas can be easily reached on foot. This makes Freiburg one of Germany’s best equipped carsharing cities. In the carsharing city ranking, which is compiled by the industry association every two years by counting the number of shared vehicles in German cities and towns versus residents,



Bicycle parking garage at the main train station

Freiburg came in fifth in 2019 with 1.59 cars per 1,000 persons. Among cities with up to 250,000 inhabitants, Freiburg even ranked first.

Fewer parking spaces, better management

Since 2016, the municipal administration has made it possible for builders to add fewer parking spaces for cars than the construction law requires. However, certain requirements have to be met, such as a maximum distance of 400 meters to a city tram stop and easily accessible and secure storage for bicycles on the land. The reduction of parking goes hand in hand with urban planning that favors foot and bicycle traffic by locating residences, shopping and small businesses in the immediate proximity (“Short Distance Town”).

For downtown and districts close to town, a parking space management concept that divides the city into three parking fee zones and designates parking for residents is in place. Eight city tram stops currently boast more than 1,400 Park-and-Ride spots. This also allows out-of-towners to access downtown conveniently via public transportation.

2.5 Urban planning

Challenges for a growing city

Freiburg's attractiveness translates into big challenges for the town: it added 50,000 residents since 1980. The benchmark of a population of 200,000 was first exceeded in 1996. In 2002, Freiburg was home to 210,000 and since 2013 the number exceeds 220,000. This development is ongoing.

Consequently, it is essential to build residences and to adjust the infrastructure. Hence, Freiburg developed its Perspektivplan Freiburg 2030, which defines the guidelines for further urban development. It stipulates three central principles for urban development: Residences and open spaces must be planned together, the structural density aims to make the city lively and communicative, and Freiburg is set to develop its space along guiding structures.

The concept included numerous participation events and discourses, which led to a clear vision: continued development of the city – keeping Freiburg. Wherever more residential space is created through interior development, close attention must be paid to better open space quality for the benefit of people.

The quality of life in a city also hinges on ecological factors. After all, urbanity is perceived as attractive only if the city offers its citizens not only lively locales,

but also green open spaces. Humans do well in structural density if they have plenty of green spaces at their disposal to create a balance and if they can reach their destinations more easily through regional and slow mobility. Vauban as a very condensed quarter that offers great quality of life and has ambitious ecological demands has shown that it is possible to meet the vastest variety of concerns through urban development.

In new construction zones, the City of Freiburg also places great emphasis on high ecological standards. A climate neutral, sustainable and efficient energy supply is planned for the new Dietenbach District. The use of regenerative energy is to produce at least as much electricity and heat as is required on location. Energy efficient construction, solar energy and heat from the environment are the key building blocks. A mobility concept with a small environmental footprint complements the structural premises.

Likewise, the new Kleineschholz and Zähringen Nord Districts will combine a sustainable mobility concept and open spaces for diverse uses to ensure excellent quality of life and ecological goals. Shared gardens are to be set up in Kleineschholz plus the option to grow vegetables on roofs.



2.6 Nutrition / agriculture

Poison free and natural management reduces lease prices

The demise of insects and birds is especially evident in agricultural landscapes. One reason is the increasingly intensified agricultural use. To combat this species loss in the open land, Freiburg's biodiversity goals, which were passed in 2019, call for the reduction of pesticide uses on farmland, an increase of the natural edge and fringe structures and the establishment of more high quality ecological open land habitats. The town's own contribution to these goals is not a small one, since Freiburg owns a lot of farmland – it leases about one eighth of the farmed areas in the county to farmers.

Hence it made sense to implement the biodiversity goals on its own leased farmland in an exemplary manner. In discourses with farmers, the administration developed an innovative and sustainable program. It calls for a voluntary agreement to be made between the city and its city owned land lease-holders. On those, chemical and synthetic pesticides are no longer to be used going forward. However, the implementation is voluntary. Yet it will pay off since the city will reduce the leasing cost for the affected areas by 50 percent. Other elements include the ecological upgrading of municipal fields by sowing species rich flowering blends aligned with the locations and the temporary decommissioning of the fields in combination with the non-use of pesticides.

The primary aim is to create new habitats and sanctuaries for insects and birds and to make a contribution to the citywide biotope alliance. If farmers implement

such additional ecological upgrades, the city reduces their leasing costs by an additional 20 percent and also provides regional, location adequate seeds. To date, about a quarter of the 589 hectares of leased farmland are already managed without pesticides.

This included around 380 hectares of green land and 70 hectares of fields. With the program, which was launched in May 2019, the city now also aims to make the remaining 140 hectares pesticide free and, by sowing blooming plants, ecologically upgrade the area.

The program was rolled out with eight farmers from the villages by the Tuniberg. By the end of 2019, an additional 18 hectares of municipal fields were pesticide free. The City of Freiburg developed the program with farmers from the country and the BLHV county association. The aim is to deliver true added value from a nature conservancy perspective and not put too much strain on the farmers' earnings. The program focuses on fields, given that the municipal meadows and pastures are already managed without pesticides.

Regional food supply for a sustainable lifestyle

The ecological importance of agriculture for the City of Freiburg is not only inherent in its share of the municipal land (in Freiburg around 3,500 of 15,000 hectares), but also in its prominence in the food for city residents. Nutrition is a weighty part of a consumption style with significant climate impact: farming, industrial processing and the transportation of food all directly affect the climate

in both the environs and more remote locations around the world. Climate friendly consumption style includes nutrition based on regional foods, preferably from ecological farming.

To determine its share in Freiburg's total consumption, the city commissioned the Swiss Research Institute for Organic Farming (FiBL) in 2016. The study was entitled "How much regional food does Freiburg consume?" The results were sobering: no more than 20 percent of the locally eaten foods originated here – with the exception of beef and milk and surprisingly low fruit and vegetable numbers.

Given that appeals to individual consumer behavior absolutely will not work, the municipal climate protection policies aim to set up a city-country partnership for the farming and food production field. After all, a sustainable and climate friendly lifestyle is primarily a question of structures, which make personal behavior options even possible. The City of Freiburg cannot establish such a partnership on its own. It will have to happen with competent partners. The Nutrition council Freiburg and Region was founded in 2018 and since 2019, the city has been cooperating with its neighboring counties Emmendingen and Breisgau-Hochschwarzwald as a model bio region.

The project is being sponsored by the Minister for Farmland Baden-Württemberg. In these networks, projects planned by the City of Freiburg in its climate protection project aiming at sustainable lifestyles and nutrition can be realized: for non-home consumption, value chains and sales channels, CO₂ retention in farm soil, moderation of unreasonable meat consumption and nutritional education. One effective sales channel for regional and ultimately also organic products is the community catering in cafeterias, childcare centers and schools. A first contribution was made by Freiburg's Cafeteria Congress 2016 under the motto "Regional and organic – What is possible in community catering?" Practical guide "More Organic in Communities" followed in 2017.

During Freiburg's 2018 Cafeteria Days, diners experienced regional, seasonal, natural, vegetarian and low waste cuisine. In 2019 the Freiburg town council commissioned the administration with the presentation of a concept that would ensure, if possible, the catering of day-care centers, schools and cafeterias at the rate of 100 percent with regional and organic products. Last, but not least, the regional contact fair "Cafeteria Meets the Region" brought together producers, retailers and professionals working in community catering.



Freiburg Cafeteria Days 2018

2.7 Freiburg's Stadtwald

Forest convention and vision

To its east and south, Freiburg's city core is surrounded by wooded hills that reach all the way to the Roßkopf, Schauinsland and Schönberg; the west is flanked by flat, groundwater and leafy green dominated moss forests.

As a forest owner holding more than 5,000 hectares, the town is selfmanaging a vast percentage of the woods. Hence, it is responsible for the retention of a diverse, nature proximate eco system, for the use of a regional, regrowing resource and for the design, accessibility and livability of a unique place for relaxation and recreation. The diverse functions and the great potential of the Stadtwald are the foundations for its high environmental, climate and social political importance.

Freiburg's Forest Convention documents binding goals and guidelines for the care and management of the Stadtwald. They were first passed by the town council in 2001 and revised a second time in 2020. The current version places increased emphasis on climate protection and climate protection effects of the Stadtwald and its management. For the first time, it pays equal attention to the traditional triad of protection-usage-recreation and the climate protection function. Following this vision, the Stadtwald is being preserved and managed in such a way that the four forest functions ecology, economy, recreation and climate protection are equally safeguarded and fostered.

Freiburg's Forest Convention breaks down the forest management vision into ten goals, among them the lasting

maintenance of the forest, the stability through diversity as well as the sustainable use of timber, the fostering of climate protection effects, the further development of the recreational function, environmental pedagogics and the cooperation with environmental research agencies.

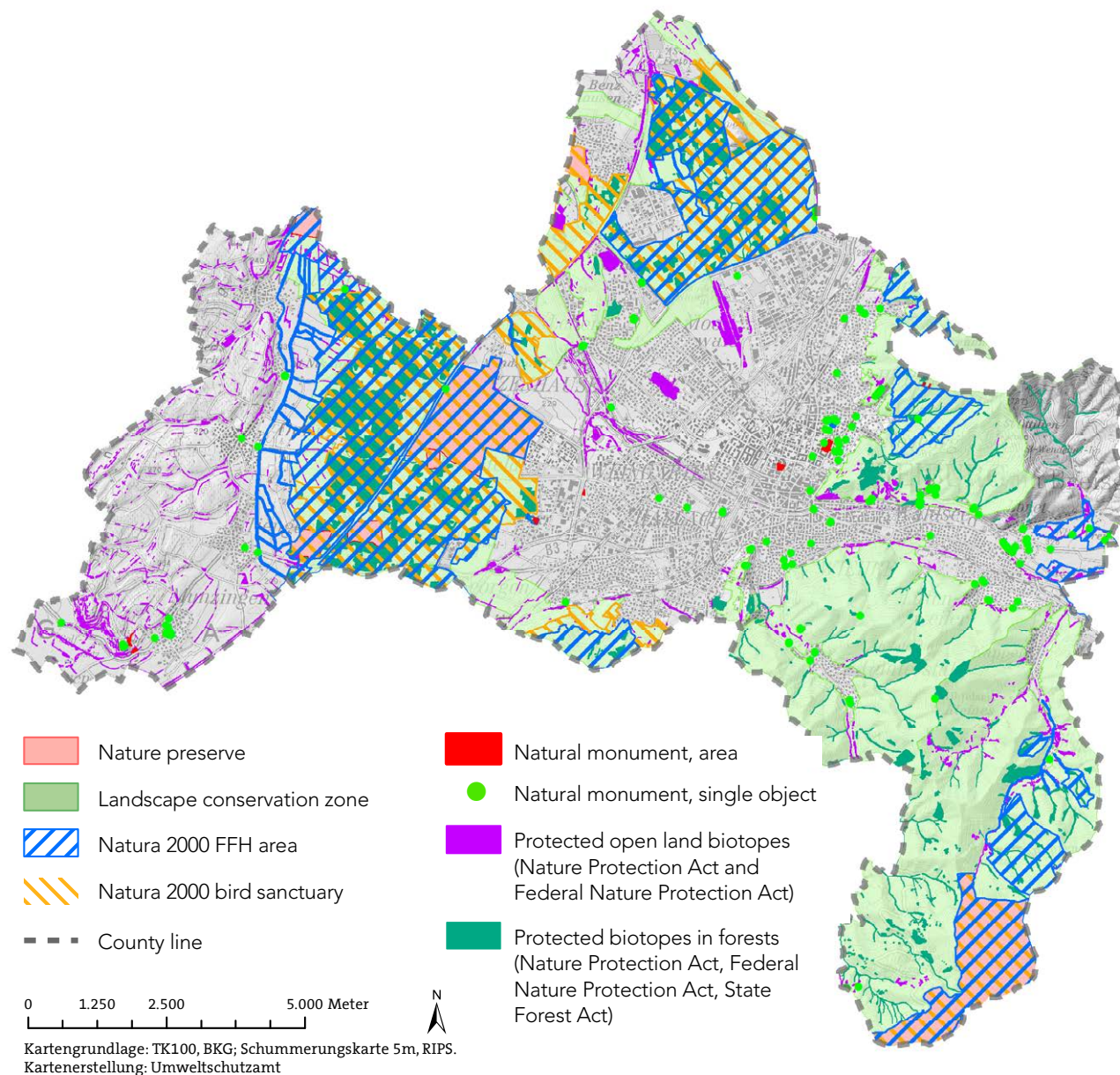
Besides these goals, it describes the ten most important concepts and tools for the implementation, such as the FSC certification, the old and dead wood concept and the offers of the forestry office and the WaldHaus in the field of forest and environmental pedagogics.

Multi-function forest as a landscape conservatory – the Mooswald

Among Freiburg's landscape conservatories, which occupy well over 7,000 hectares, the Mooswald is the largest with its 3,251 hectares. While it was once an impenetrable swamp forest, the area has since evolved into a culture forest.

In medieval times, the Mooswald served as a feedlot for pigs and delivered wood for construction and as a fuel. Today, it is still being used in compliance with Freiburg's Forest Convention. At the same time, it offers plenty of premium recreational space.

In the post World War II decades, the Freiburg sprawled to the west – around 100 hectares of the Mooswald were lost as a result. To prevent the further shrinkage of the forests, the area was designated as a landscape conservatory in 1993. It soon was added to the European Conservatory System NATURA 2000 – thanks to its unique flora and fauna.



Supra-regionally prominent protected species in the Mooswald are the many species or habitats at risk, such as the Auwald with its alders, ash wood trees and willows or the Sternmieren-Eichen-Hainbuchenwald. Careful use makes it possible to foster and safeguard the inventory. Rare species, such as the stag beetle and hero ram, the Bechstein's bat as well as the greater mouse eared bat.

Hence, the Mooswald was designated as an FFH region and, because of the presence of the rare middle spotted woodpecker and other woodpeckers as a European bird sanctuary.

From the WaldHaus to Germany's tallest tree

Her name is "Waldtraut vom Mühlwald." She is a Douglas fir. Its most recently determined height of 66.58 meters makes it Germany's tallest tree. In March 2008, Waldtraut was measured by the Geodeta Institute at the University of Karlsruhe. The survey office Freiburg updated the measurements in November 2012 and August 2013. Estimates have the Douglas fir sprout in 1931. At chest height, its circumference was 3.38 meters during the most recent measurement. The WaldHaus Freiburg is the perfect point of departure for a tour to Germany's tallest tree. It is located on the Wonnhalde near the southern edge of town. A hiking trail with signs will take you to the natural monument over about four kilometers.

Arboretum – the largest living collection of evergreens in Germany

Strollers interested in forestry also have the option to embark in different directions from the WaldHaus to the Stadtwald-Arboretum, a diverse collection of trees. At the end of the 19th century, forest workers in Freiburg began to plant foreign trees in nearby forests for experimental purposes. However, only few tree species could be integrated into the native forests. The best known tree, which is characteristic for Freiburg's Stadtwald is the North American Douglas fir (*pseudotsuga menziesii*), which was used in Freiburg's forestry as early as 1896. Economically, it is one of the most important tree species here.

The beech tree leads the list in the Bergwald with a share of 26 percent, followed by the Douglas fir (19 percent) and the fir (18 percent). Other trees are the pine tree (11 percent), the maple (7 percent) and the spruce (1 percent). In the Mooswald valley, the ash dominates with

24 percent, followed by the oak (19 percent) and the red oak (12 percent) as well as the beech tree (10 percent), the alder (9 percent) and the maple (7 percent).

To focus the eye of visitors on the diversity of the forest, the Arboretum offers several themed pathways. In 2007, the City of Freiburg installed them in partnership with two associations – "Nature Park Southern Black Forest" and "Friends of the Stadtwald-Arboretum Günterstal." The largest living collection of pine trees (*Abietum*) in Germany is located in Günterstal. Many of these species are at risk in their natural habitats or are close to extinction, which is why botanists from Germany and abroad visit the location.



2.8 Waste management

Recycling expansion

Ecological waste management has many facets and complies with a five-stage waste hierarchy. The first priority is the prevention of waste and thus the reduction of its volume. Reuse and recycling are next in line. Waste should not be utilized energetically until all other options have been tried. Ultimately it should be disposed of in the most ecologically sane way.

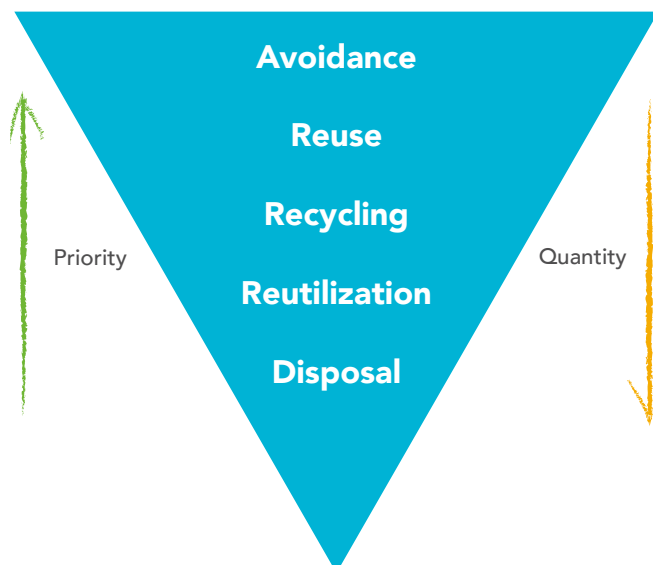
In the past, many terms have been created in this context. The philosophy of “zero waste” aims at not creating any waste at all. Other terms, such as recycling economy or “cradle to cradle” describe waste management that returns waste to the material flow as secondary raw materials. To develop practical examples of the cradle to cradle management, Freiburg and six partner cities receive funding from the Greencycle project. The project, which is sponsored as part of the EU-Interreg program, will run from 2017 through 2020. As long as

the waste free society is still a vision of the future and waste is part of everyday life, Freiburg’s waste management pursues two primary goals: reduction of the waste volume through conscious purchasing, which means enlightenment of consumers, and increase of the recycling rate among incurred waste.

Since the early 1990s Freiburg has been expanding its bandwidth of separate collection systems to reduce residual waste. Even ultra-modern sorting systems are unable to sort out the material blend contained in residual waste effectively enough to make subsequent recycling possible.

Consequently, the Abfallwirtschaft und Stadtreinigung Freiburg GmbH (ASF) tracks biowaste, packaging, used paper, used glass, electrical and electronic devices and old wood separately to subsequently recycle them in the respective recycling systems.

The five-level waste hierarchy



Waste prevention with the “FreiburgCup”

However, waste prevention also tops the list in Freiburg. Given that it requires especially the help of consumers, the city has long been betting on the provision of information and support. This also includes publicity intensive prevention projects, such as the special uniform multiuse cups available in more than 100 coffeeshops for coffee to go under the name of “FreiburgCup.”

The effectiveness of this and other measures has been evident for years: per capita, the waste volume in the city is declining. The amounts of residual and bulky waste to be removed has been reduced to 108 kilograms from 179 kilograms from 2000 through 2018. The volume of separately collected reusable materials remained largely consistent during this time. This shows that residents produce less waste and also dispose of a larger percentage of their waste through the respective reusable material systems.

Overall, Freiburg residents collected 73 percent of their household waste separately in 2018 and thus optimally prepared for recycling.

An important point of departure for waste management is also its work with children and adolescents. The ASF on a commission from the town administration handles a large number of projects to increase the awareness among the young generation for the responsible interaction with their life environs. For instance, in childcare centers, it presents Freiburg’s waste management along with its benefits for the environment. The ASF also supports kindergartens and schools in the choice of proper waste containers and offers child adequate stickers for the separation of waste.



For the sake of the environment: Coffee to go in the FreiburgCup

Raw materials from effectively sorted waste

Some of the separately collected waste gets a second life as so-called secondary raw materials. For instance, organic waste from the bio container goes to the Reterra Freiburg fermentation plant where it is subsequently processed into compost. The process generates biogas, which in turn, in efficient heatpower-coupling produces electricity and heat – an optimum combination of material and energetic utilization.

A large portion of the used paper collected in Freiburg’s green bins can be used to make new paper and cardboard products. Part of the packaging waste in the yellow bag is used to make a product called regranulate after sorting. It is the base material for recycled plastics. The three used white, green and brown glass fractions are turned into new bottles and glasses in several process steps.

The recycling of electrical and electronic devices is particularly important. Given that the usage cycles – especially in the mobile communication sector – are getting shorter and shorter, the raw materials they contain, such as copper, gold



Former landfill
Eichelbuck

and rare earth, are more coveted than ever. In many of Freiburg's districts, the installed material collection receptacles offer an option to dispose of small electrical appliances besides used glass and clothing. The municipal recycling agencies accept larger appliances.

TREA as the backbone of waste disposal

Nevertheless, rather large quantities of residual waste remain, which are combusted in the Thermal Residual Waste and Energy Production Plant (TREA Breisgau) – another closed material cycle. In building the TREA Breisgau, Freiburg cooperated with surrounding counties. The goal was to install a long term, ecologically expedient, economically viable and regional waste management site. The TREA Breisgau has a capacity for 150,000 tons of domestic and commercial waste for thermal processing. The City of Freiburg has a contract for a contingent of between 29,000 and 52,000 tons at fixed prices, which is secured through 2030. Hence, the TREA provides the backbone for the safe disposal of municipal waste. A four-stage smoke gas purification system ensures that the exhaust gas com-

plies with the imposed limits. Currently, the plant comes in at about half of the permitted maximum levels. The sludge that remains after combustion is mixed with clay and used as recultivation material on the former Eichelbuck landfill. Moreover, the system produces electricity and heat for the Breisgau industrial park and the region.

A decommissioned landfill delivers biogas and solar power

Like the City of Freiburg, the ASF does not limit its ecological understanding to its core responsibilities. One example is the development of the Eichelbuck landfill into an energy mountain. The landfill stopped accepting new waste in 2005, since the Technical Directive Quarter Waste, which has been in effect since, prohibits storage without pretreatment in all of Germany.

Even while the landfill was still in operation, the landfill gas was vacuumed out of the interior of the landfill body and, in a combined heat and power plant in Landwasser, produced electricity and heat for around 3000 households. Given that the gas yield and quality of a landfill that is no longer in use decline steadily, biogas sourced from the biowaste fermentation site Reterra Freiburg has been supplementing the landfill gas to continue to supply the combined heat and power plant with gas. Micro gas turbines on the landfill also utilize the lower methane landfill gas and thus cover the heating needs of the food residue treatment plant in Eichelbuck.

The recultivation of the former landfill will be complete in 2022. It has long become a visible energy mountain: since 2011, a 2.5 megawatt photovoltaic system has been sitting on the southern side of the landfill. It was upgraded to three megawatts in 2019.

Compost, energy and plant carbon from green cuttings

In 2016, Freiburg rolled out a new green waste management concept. Since then, the ASF has been processing all green cuttings from the city at the Eichelbuck, deploying a multi-stage process for both, material and energetic uses. First, the green waste is sorted and broken down, so that different waste fractions with specific properties remain. They are optimally used. The woody part is turned into gas in a novel pyrolysis system to produce certified plant carbon. Its potential uses are diverse: it can enhance compost, improve fermentation substrates, increase methane yields and improve soil. A wood chipping system burns rough woody material not suitable for pyrolysis. The hot gas that develops during this process generates electricity and heat in a micro gas tur-

bine. In 2020, a composting system was erected on the landfill plateau, which is now going to utilize the largest portion of Freiburg's green waste.

The ASF is looking for environmentally appropriate solutions not only in the waste sector, but also for its own fleet. In its conventional fleet, the waste management company uses only vehicles that are in compliance with the highest exhaust standards Euro 5 and 6. However, the end of the diesel operated vehicles is in sight. That is why the ASF is partially betting on alternative drive technologies now. In the downtown area it uses hybrid collection vehicles, but also increasingly electric drive cars, vans, small trucks, e-bikes and cargo bicycles. The first fully electric street sweeper in Germany has been driving from the hangar of the ASF into downtown Freiburg since 2017.

Germany's first fully electrical street sweeper drives through Freiburg



2.9 Alignment with climate change

Climate protection is one of the key responsibilities of politicians on all levels. However, the past few years have increasingly demonstrated that climate change is already evident – also in Freiburg.

Many in Freiburg have experienced the growing number of hot and arid days first-hand, for instance because of the dry riverbed of the Dreisam. Besides climate protection, the city thus explores the alignment with the consequences of climate change to ensure that Freiburg remains a livable city in the future.

This need became obvious a few years ago, which resulted in the establishment of a citywide “Action Team Adaptation” in 2011. Through 2013, the competent agencies, operations and municipal enterprises as well as the State Health Agency worked on a pertinent climate change adaptation strategy with the objective of each office taking the required measures for its field. Since March 2020, the town administration has the posi-

tion of a climate adaptation manager. The position was created to further develop the adaptation strategy and to coordinate the implementation of concrete measures – in particular in fields several agencies are responsible for. The challenges range from the alignment with rising temperatures to the change of precipitation, which brings with it an increasing risk of heavy rains or floods.

It's getting hotter and cities must respond

From a global perspective, based on analyses of the World Organization for Meteorology, the years 2015 through 2019 were the five hottest since weather tracking first started in the 19th century. Looking at Germany, the trend is similar. Based on measurements of the German Weather Service, 2018 turned out to be the hottest and sunniest year since regular records were kept. Moreover, it generated the lowest amounts of precipitation since 1881. The third hottest year was 2019.

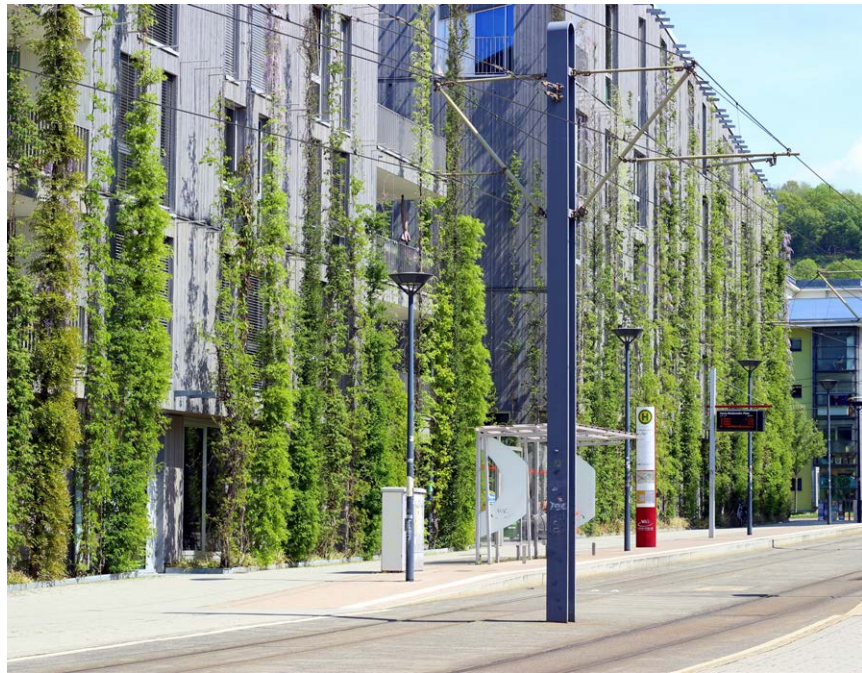
Climate strip depiction of the recorded Freiburg climate data (1870 - 2018)



Especially for Freiburg, which is located in one of Germany's warmest regions, the heat is a special challenge. From 2017 through 2019, the town administration had the town climate analysis of 2003 updated with a new, detailed climate model and compiled an urban climate adaptation concept covering the heat issue. In 2019, Freiburg received an award in the contest "Climate Active Community 2019" from the Federal Environmental Agency and the German Urbanistic Institute.

The urban climate adaptation concept is based on a citywide analysis compiled for Freiburg, which concisely shows for each building block, how sensitive and vulnerable the individual districts are to heat. Especially exposed areas were defined as hot spots. All future zoning plans and other urban development measures are required to take into account the results of the climate adaptation concept. One extremely important aspect is the maintenance of a cold air supply. Especially on hot summer days, cold air flowing in from the Black Forest in the evenings – the famous Höllentäler – and from the Schönberg, noticeably cools down the neighborhoods. Hence, in the interest of the city overall, it is imperative to not build new structures that block the cold air system and could interfere with it.

The city's urban climate adaptation concept also includes numerous other measures aiming at the reduction of the heat exposure during the summer: the maintenance and creation of public and private open spaces, more shading in public areas, the planting and maintenance of trees in the city, the creation of green zones in courtyards, the unsealing of roofs and facades; in summary everything that brings more plants into the city helps cool it down.



Green City Hotel
in the Vauban district

Under the direction of the Environmental Protection Office, the town administration is working on a suitable subsidy program for green zones on roofs and facades as well as unsealing measures.

What challenges does climate change impose on the Stadtwald?

To prepare the next forest generation for the projected climate changes as effectively as possible, it requires a large percentage of draught tolerant trees and also a vast diversity of trees. In its culture securing and young tree maintenance, the forestry office therefore fosters the existing location adequate diversity of trees and especially draught tolerant growth. Especially in low diversity natural age reduction efforts, the forestry utilizes remaining gaps to plant additional climate adjusted trees. Whenever larger damaged areas arise from draughts, insect or storm damage or ash shoot extinction, diverse blends of climate adjusted trees are given preference. In small areas, the gaps are saved for the succession of compatible green leaf trees, such as the beech, willow, mountain ash and spruce.

When it comes to the choice of trees, local, draught tolerant species, such as the oak, linden tree, maple, cherry, beam tree berry and among evergreens, the established and well-integrated Douglas fir, are given preference. The potential expansion of the tree spectrum is based on scientific insights and cultivation recommendations. Regionally well-adjusted are for instance trees sourced from regions that are geographically to the south and east. To mitigate forest development risks, the Forestry Office works towards well blended species of at least four each, which should make up at least ten percent. In woods that are middle aged or old and in which the mix of species can hardly be changed, the forestry work and main uses aim at safeguarding the individual tree stability and to reduce damages caused by insects.

Measures that reduce the age of the natural growth through the diversification of trees and maintain the interim growth under the old trees are top priorities. The nature proximate forestry work that has been pursued for decades and the forest protection in the Stadtwald yield benefits: richly structured mixed trees with interim and low growth that reduce the age of the inventory as well as different thick and old trees deliver compa-

rably solid stability and also have great regeneration capabilities.

All forestry research institutions are working intensively on services affiliated with changing site conditions, tree species compatibility and suitable forestry treatment models. This results in insights and climate change adaptation recommendations for the Stadtwald. The measures described here are periodically evaluated and enhanced.

More trees in town – one celebrates every birth

The creation of more green and shady areas in town instantly helps reduce the heat stressors for humans. The City of Freiburg bets on it and plants additional trees in public areas. The Garden and Civil Engineering Office has identified new planting locations and, since 2015, plants between 40 and 50 new trees every year. In the urban areas, it also wants more trees to prosper in private spots.

One incentive is the “Birth Trees” initiative. Parents of children born in Freiburg receive a voucher for a choice apple, pear or cherry tree. They are encouraged to order and pick up the plant at the City Garden Center. The city foots the bill. The badenova as a municipal enterprise sponsors for instance the climate planting nursery at the Freiburg WaldHaus and a project for nature proximate green zones in the Freiburg-Nord industrial zone from its fund.

Extreme weather events are on the rise – flooding and heavy rain

Climate projections show that the progression of climate change can also modify precipitation to the point where summers get drier and winters wetter. The duration and intensity of precipitation may change as well, which increases the risk of flooding and heavy rain.

The Freiburg city forest near Günterstal





Flood at the Schwabentor Bridge

In joint community/state projects, the four regional councils have compiled flood risk maps for all larger waterways for all of Baden-Württemberg, which will be updated in the future. The geographic link is not based on administrative boundaries, but waterway catchment areas. On March 13, 2014 the Freiburg Regional Council officially gave the city the flood risk maps for Freiburg County. They can also be accessed at hochwasser.baden-wuerttemberg.de.

The flood risk maps provide the foundation for the determination of the protected goods (health, cultural objects, environment, business activities) located in the areas that are at a minimal, average and high risk of flooding. Flood risk management plans can be generated on the basis of the former. They analyze the potential consequences, risks and damages of flooding. Moreover, they offer the chance to be able to use the flood risk defense insights in emergencies. In a pilot project, such plans are currently being compiled for Freiburg.

Experience-based results already indicate where Freiburg is particularly affected by heavy rains: depending on the concentration of the rain, underpasses are flooded, gullies are blocked, underground garages, cellars and ground floor areas are under water. Evaluations for dewatering concepts are awarded in zoning plans, in which, if relevant, flooding and heavy rain risks are also addressed with the respective preventative measures.



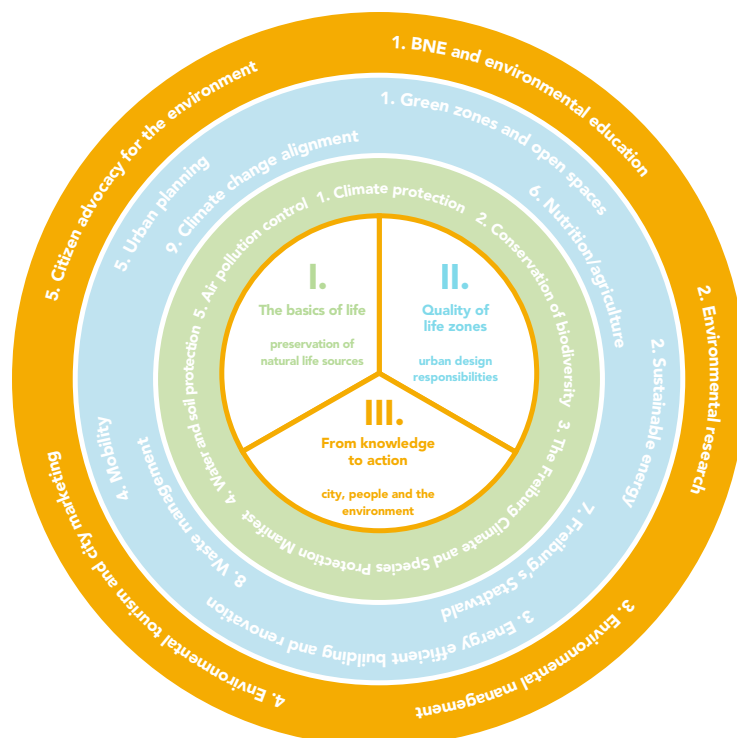
FROM KNOWLEDGE TO ACTION

**city, people and the
environment**



III.

1. BNE and environmental education
2. Environmental research
3. Environmental management
4. Environmental tourism and city marketing
5. Citizen advocacy for the environment



3.1 Education for sustainable development and environmental awareness

Sustainable action hinges on knowledge. The City of Freiburg boasts a diverse educational landscape, which includes environmental studies.

Many of the programs sprang from the town. However, associations, initiatives, foundations and institutions also offer a broad portfolio. The diversity of providers goes hand in hand with a large number of education venues. The high degree of networking is typical for Freiburg.

Many players work collaboratively in numerous education programs: sometimes the programs are offered directly by the city and many are partially funded by it, while others fund themselves. They all provide the basis for the comprehensive education program available in Freiburg for sustainable development (BNE).

Freiburg has a great number of non-school education venues, associations and initiatives that are committed to sustainable development education.

To structurally move the topic forward, seven environmental education venues have been receiving additional funding from the city since 2015. The planetarium, Mundenhof, Weingarten adventure playground, the WaldHaus Freiburg Foundation, Kinderabenteuerhof Freiburg e.V., Solare Zukunft e.V. and the Eco Station have since been able to intensify and permanently expand their educational programs for sustainable development, especially in the childcare and school segment and for child and

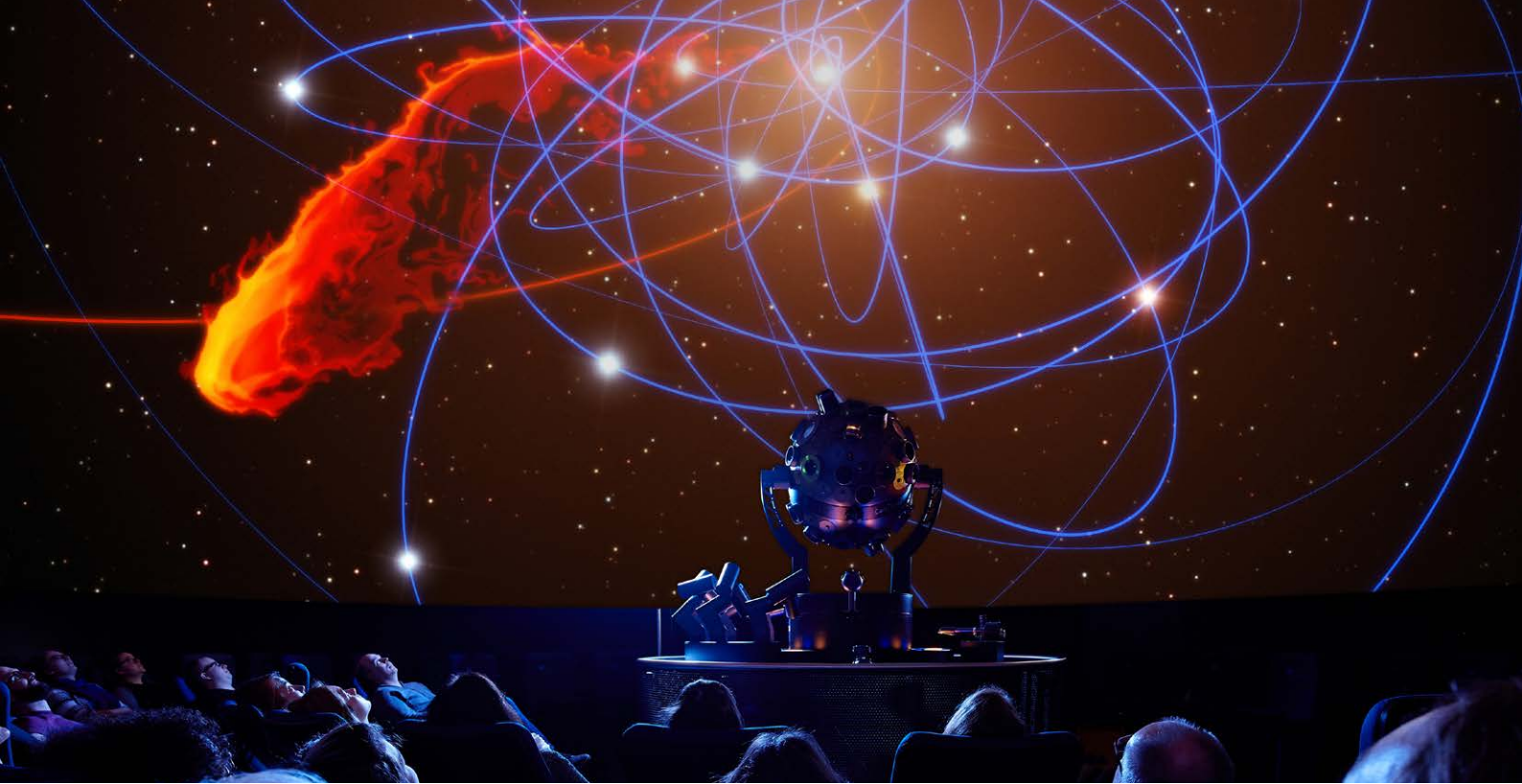
adolescent facilities in the non-formal sector. For instance, the offers of the environmental education facilities are linked more closely with support programs at schools and childcare centers. Through these collaborations, they aim to further develop and bundle the activities and to transfer good practices on a broad spectrum. In addition to the structural reinforcement of Freiburg's environmental education facilities, the institutions are developing a BNE Strategy 2020 with the staff unit "Freiburger Bildungsmanagement" to broadly drive forward education for sustainable development.

Fifty-Fifty – Energy conservation funds school projects

Project "Fifty-Fifty" is a very successful environmental education project. The City of Freiburg has been offering it to schools since 1997.

The concept: the prudent behavior of students and teachers saves energy and the schools are disbursed half of the cost cuts. The institutions can use the funds for school activities, other savings measures or the production of regenerative energy. The other half of the saved amount is for the benefit of the city. So far, 2.2 million Euros have been saved.

At the beginning, 20 schools started – on a voluntary basis – to use simple means to save energy and costs. To date, 45 schools have participated in the program and prevented the emission of 11,000 tons of carbon dioxide by saving 7.5 million kilowatt hours of electricity, 29 million kilowatt hours of heating energy



Presentation in the Freiburg Planetarium

and 80 million liters of water. At the same time, the topic is covered in lessons, which produces numerous creative activities and smart ideas at schools. For instance, switches in hallways, classrooms and toilets were labeled, electrical appliances such as hot water boilers were removed, as were unnecessary lamps and the coffee machine warming cycle was replaced with thermal carafes. In lessons there are always affiliated issues, for instance if the functioning of thermostat valves is covered in physics lessons.

The planetarium as an environmental education venue

Freiburg's planetarium holds a special place among Germany's stargazing venues. All of the technical equipment was initially developed by the vocational school. Richard Fehrenbach, a machine engineer who taught there, starting in 1959, assembled cogwheels, lamps, lenses, electric motors and collector rings into a dedicated planetarium projector with a few of his coworkers.

In March 1975 at the Richard Fehrenbach Vocational School, Baden-Württemberg's first post war planetarium opened.

Extraordinary and in true Freiburg style, the program soon extended beyond the mere depiction of the starry skies. The carefully produced and pedagogically smart programs also address environmental and societal issues – elegantly combined with traditional planetarium themes. For instance, the depiction of the sun was combined with a solar energy presentation as a modern energy resource.

Climate change and material flows are also topics at the planetarium. In December 2002, the planetarium moved into the main station building, along with a new projector and a planetarium cupola with a diameter of 13 meters, which now accommodates 140 individuals. By now, the planetarium welcomes more than 50,000 visitors a year.

Vocational school turned display window for renewable energy

The Richard Fehrenbach Vocational School is an environmental education hot spot: the solar tower, built in the early nineties, allows students to experience regenerative energy thanks to its photovoltaic system and numerous solar

thermal options. It is also equipped with a modern solar cooling and heating system. A solar teaching path complements the system, as do a water wheel, a solar fueling station, a heating basement with six different heating systems and a wind wheel on the school property.

School catering makes nutritional education part of the package

The City of Freiburg strives to offer an ecologically and regionally produced lunch at its schools. The aim is to use fresh, high quality ingredients. Fresh and frozen vegetables must come from controlled organic production.

KonTiKi – Understanding nature

KonTiKi (Kontakt-Tier-Kind) is the nature-pedagogic education and recreation facility in the animal nature adventure park Mundenhof. Here, children have been able to playfully and with all of their senses discover nature for more than 25 years. Nature becomes touchable and understandable from a language and image perspective. The interaction with animals encourages children to act selfaccountably. As a result, they assume responsibility for their world and experience that they can actively participate in the protection of nature and the environment. Many children

long to have contact with animals. At the KonTiKi they familiarize themselves with the needs, feelings and behaviors of animals through these encounters. The processing of animal products, such as wool, eggs, dairy and honey also lets children experience animals as resources. The origins and production of foods and textiles become comprehensible. At the same time, they become aware of the complex processing and interact with their foods.

The City Library – Multimedia environmental education

Not only does Freiburg's City Library offer energy and nature protection related literature, it also facilitates courses that teach students how to procure multimedia information with environmentally specific content. Teachers at Freiburg's elementary schools can also use the Media Portfolio Environment and other Media Portfolios on naturerelated topics. They contain books, games and CD-ROMs. Instructional literature on energy conserving construction is as helpful to adults as are healthy nutrition publications. They can also be accessed online via links. Comprehensive information on European environmental initiatives and legislation is available at the Info-Point Europe.

„Freiburger Umweltgespräche“ in the Jazzhaus Freiburg



Freiburger Umweltgespräche

“Freiburger Umweltgespräche” is the title of a series of presentations that began in February 2018. The Environmental Department of the City of Freiburg and Faculty Environment and Natural Resources at the Albert Ludwig University Freiburg invite interested citizens to the Jazzhaus several times a year. Up-to-date information on environmental and climate protection as well as the climate change that is already evident in Freiburg makes the series directly accessible and easy to understand. With this format, the city and the university aim to foster and enable the exchange and discourse between society, science and communal politics on these important environmental issues. The purpose of the presentations is to provide impulses that trigger contemplation and deeper discussions.

Environmental topics at the Volkshochschule Freiburg

Environmental education is part of the responsibilities of Volkshochschulen (Adult Education Classes = VHS) anchored in the law. It is part of the “Politics – Society – Environment” catalog. The VHS Teaches the responsible handling of the environment and natural resources. It reflects the importance environmental protection and policies have attained in the public eye. The VHS Freiburg does not only want to do justice to the arising interest in environmental issues, but also show options for everyone to get actively involved.

This means that environmental knowledge must be shared with participants and action opportunities must be highlighted. In presentations, seminars and excursions, the VHS Freiburg also addresses the bigger picture – including the relationship between environment and health, the consequences of climate change or mobility. It discusses concrete questions on location. Topics may in-



Botanical Garden

clude waste disposal, sustainable building or practicebased instructions for people’s personal interaction with the environment. This includes even bee-keeping or gardening work. Also very popular are programs that focus on the adventure component. This includes trips to the Black Forest, the Ortenau or the Markgräflerland. Thanks to numerous collaborations with partner institutions working in environmental fields, the Volkshochschule Freiburg can offer all target groups fundamental information and competencies that are of relevance for the interaction with the environment.

The Botanical Garden – Science meets contemplation

In 2020 we are not only celebrating 900 years of Freiburg, but also the 400-year-anniversary of the Botanical Garden. Established in 1620 as the Botanical Garden of the University of Freiburg, it was destroyed several times over the course of its history and always rebuilt. As a scientific venue of the University of Freiburg it is a diverse place for research and teaching.

Botany students can find virtually all plants they have to know as part of their flora studies in the Botanical Garden. Bionics is a central research topic.

Today's Freiburg Botanical Garden cultivates around 6,000 different plant species from all over the world. In 1879 it also opened up to the public. Thus it is not only a teaching venue. It is a place where everyone who is interested can contemplate the diversity of local and exotic natural beauties and put their everyday cares on hold. The four greenhouses and a topically structured outdoor space showcase not only beauty, they also make it possible to study the systematics of plants and their development. Visitors can explore the Botanical Garden on their own or join one of the numerous guided tours.

WaldHaus Freiburg – Sensibility for the forest as a habitat

The WaldHaus Freiburg opened in 2008 as an innovative education and information center on subjects such as forest, sustainability and use of wood. The objective of the operator – the WaldHaus Freiburg Foundation – is to familiarize people with the ecosystem forest and its multiple functions for society.

The WaldHaus aims to create awareness among its visitors for the needs of the forest and its sustainable use. To that

end, the WaldHaus bundles the competences available in the region as far as forest and sustainability are concerned and networks them beyond expert and national boundaries.

In recent years, the WaldHaus has evolved into an education, knowledge transfer and information hub, which makes sensual and practical experiences as well as communication between young and old possible. The topic "Education for sustainable development" (BNE) plays a particularly prominent role. Through the establishment of long term and innovative education projects, it was possible to accentuate highlights. Besides the Forest Laboratory and the Timber Workshop, the most important learning and experience site, is the adjacent Stadtwald. Thanks to the implementation of the BNE in the state's curriculums, the work of the WaldHaus is continuously gaining interest.

Going forward, the new "Wald&Klimaschutzlabor" will in particular provide students in higher education with content on the topics of forest and climate. The showrooms on the top floor of the building offer alternating exhibits, the comprehensive yearlong program, group offerings and vacation programs, while the attractively designed outdoor space offers a broad and interesting spectrum to the general public.

Known beyond the city limits – The Eco Station

The Eco Station on the Flückigersee is a key environmental education center in the Freiburg region. The ecological model building with its extraordinary architecture is one of the oldest institutions of its kind in Germany. The Eco Station offers event series, seminars, projects and workshops on nature conservation, environmental education and sustainable development to the public,

WaldHaus Freiburg





Eco Station Freiburg

most especially to students. In cooperation with the Independent Waste Management Freiburg (EAF), it presents, among other things, environment-pedagogic programs on the subjects of waste prevention or composting to student classes, kindergartens and the general public in Freiburg (e.g. the complimentary "Waste Days at Schools," the "Green Classroom," "Composting Advice" or the "Environmental Theater Days"). Project "Climate Trax" also makes an interactive experience of climate protection possible through "Mobile Learning." Training as an "Energy Advocate" is being offered and project "BildungKlima-plus" was established as the "Educational Center Climate Protection Center" in Freiburg.

The Eco Station building with its heat insulated clay walls has had a solar power system since it was built in 1986. With an output of one kilowatt, it was the largest in Germany at the time. Today, the Eco Station is among the first certified CO₂-neutral environmental education centers. Visual eyecatchers are especially the green wood cupola roof and the adjacent organic garden. From the start, the construction of the Eco Station

by the Alliance for the Environment and Nature Conservation (BUND), received support from the start from the City of Freiburg and the "Nature Conservancy Fund Foundation Baden-Württemberg" and still does today.

Solare Zukunft e.V.

Freiburg's environmental educator Solare Zukunft e.V. has assumed responsibility to make transparent the interdependencies between climate protection and energy consumption in the context of sustainable development and to present practical action options for everyday applications. Children, adolescents and adults are to be made aware of sustainable, responsible interactions with energy and resources. A diverse education portfolio tailored to the needs of kindergartens, schools and communities as well as a continued education program for teachers aim to transport the content. As a result, topics renewable energy and energy use are introduced in daycare centers and schools with the aim of achieving sustainable developments. Solare Zukunft e.V. has received several awards for its work and doesn't just make a difference on the local level, but is part of a global network.

ECOtrnova e.V.

The ECOtrnova association is a regional alliance for the common good. It consists of environmental research, consulting and education institutions, citizens, associations with an environmental orientation, initiatives, offices and companies as well as other interested parties from the region on the southern Upper Rhine. The association's work benefits the public.

ECOtrnova cooperates with its member organizations and institutions as well as other establishments, such as the tri-national Energie-3Regio network, the ECO Foundation for Energy-Climate-Environment, the ZEE Center for Renewable Energy as well as other institutions and the student representatives of the University of Freiburg.

ECOtrnova e.V. conducts an entire series of joint projects in Freiburg and the region – some even beyond national boundaries. It also engages in critical education, information and lobbying work. Special emphasis must be placed on the Saturday Forum, which has been hosted since 2006 and attracts a lot of attention. Under the auspices of the Mayor for the Environment, it also received an award from the State of Baden-Württemberg. In semester programs, the association organizes presentations, discussions and tours on climate protection, energy, environment and sustainable development, always in Saturdays. The presentations are open to all and reach a lot of participants. The subsequent excursions on innovative projects also enjoy great attendance regularly.

fesa e.V.

The fesa e.V. has been active in the field of climate protection and renewable energy in southern Baden since 1993. The central topics are fundamentals and effects of climate change, climate

change adaptation, energy revolution and renewable energy as well as climate protection (efficiency, sufficiency, consumption). Besides policy work, communal campaigns, networking and public relations work, education for sustainable development (BNE) and environmental education are the focal points of the association's work. Various school projects package the topic in an age adequate manner and deliver it to elementary and higher education schools. Ages range from first class to senior class.

In addition, fesa e.V. works in adult education through VHS courses and also engages in the training of multipliers, such as teachers, climate protection managers and parents. Moreover, on the community and county level it advocates for the promotion of BNE.

Innovation Academy

The Innovation Academy, an alliance for the common good domiciled in Freiburg organizes excursions, expert travel, seminars and workshops in the European tri-country region – Germany, France and Switzerland. The destinations include innovative and future-ready companies, institutions and model projects. The central topics are renewable energy, urban planning, new construction, transportation, waste management, water utilities, nature conservation, agriculture and sustainable tourism.

Based on practical examples, the Innovation Academy e.V. shows how sustainable development can be initiated in urban and rural areas. In conjunction with seminars, presentations and excursions, interested individuals receive information and impulses for their own projects.

Pedagogic programs, such as tours, rallies or quizzes, offer students fun and at the same time deeper insights into the

topic of sustainability and allow them to experience them from the innovative side. Based on their age, projects are offered for all types of schools and the different subjects interactively. Upon request, they are also offered in English and French starting on class level 7.

Kinderabenteuerhof e.V.

In 1996, a parent initiative established the Kinderabenteuerhof Freiburg e.V. as an association for the common good. Since 2002, the association has been accredited as a purveyor of open and non-school children's and youth assistance and is a member of the Alliance of Adventure Playgrounds and Youth Farms. The objective of the association is to foster children and adolescents through the operation of an adventure playground with an inclusive and ecologi-

cally oriented profile. Central elements in the program refer to applied ecology. This includes natural cycles, the careful handling of resources, the use of (self-made) organic foods and the use of regenerative energy. The goal is to have all children and adolescents test and experience an autonomous and community responsible interaction with other people, animals and nature.

The integrative nature and animal-pedagogic approach offers a broad field for learning and experiences. In addition to traditional scholastic training of intellectual skills, it teaches especially social, ecological, artistic-artisan and nature as well as animal care competences. Here it is possible to gain experiences many urban children lack completely these days.

Cherry picking on the Kinderabenteuerhof



3.2 Environmental research

Nuclear protests turn into environmental research

In Freiburg, environmental research began in the 1970s. This was affiliated with the resistance against the nuclear power plant Wyhl on the nearby Kaiserstuhl. In November 1977, 27 citizens established the Freiburg Eco Institute and brought their broad expertise in the fields of engineering science, physics, chemistry, law and theology to the table. The initiator was a law office that took legal action against the NPP Wyhl. By the way: it was also the Freiburg Eco Institute that deployed the term “energy revolution” early-on – it was the title of a book published in 1980.

State and federal institutions and worldwide representatives

Today Freiburg’s environmental research network comprises renowned institutions, such as several of the Fraunhofer Society. The world association solar research – the International Solar Energy Society (ISES) – also has its seat in Freiburg. The association came to Freiburg in 1995 from Australia, after the city had emerged as a solar center that was internationally recognized. Another institution in Freiburg is the ICLEI, the international convention of cities and communities committed to sustainable development. Its European administration took up residence in Freiburg.

Moreover, numerous federal and state agencies with environmentally specific assignments make Freiburg their home. The Federal Agency for Radiation Protection (BfS) has an office in the city, which operates a measuring station on Freiburg’s Schauinsland Mountain, which

is leading in air monitoring in Germany. This station also has a long history. In 1946, researchers at the Albert Ludwig University conducted experiments for the characterization of cosmic radiation in the high elevations of the Black Forest. They were able to prove the presence of traces of radioactivity and precipitation samples for the first time in 1953, which were the results of nuclear weapons testing.

Since 1957, the measuring station on the Schauinsland has been monitoring the atmosphere completely for artificial and natural radioactivity. Not far from the BfS-Station is also the Leibniz Institute for Solar Physics, which was originally founded as the Kiepenheuer Institute for Solar Physics and researches physical processes on and inside the sun from an experimental and theoretical perspective.

The environmentally relevant research in Freiburg also includes a field office of the Max-Planck-Institute for Chemistry, which researches fire ecology, the Chemical and Veterinary Research Office (CVUA) of the State of Baden-Württemberg, the Forestry Experiment and Research Institute Baden-Württemberg (FVA), the State Agency for Geology, Raw Materials and Mining (LGRB) as well as the State Vintners’ Institute Freiburg.

Europe’s largest solar research institute

Freiburg’s reputation as a city of environmental research is dominated primarily by the Fraunhofer Institute for Solar Energy Systems (ISE). It was established in July 1981, i.e. at a time when solar research for many in science and



The "Sun Ship" in the Vauban district

technology still appeared to be untenable. However, Freiburg physicist Adolf Goetzberger, who previously worked at the Fraunhofer Institute for Applied Solid Body Physics, recognized the potential of solar energy early-on. Against quite a bit of resistance from German politicians and scientists, he created an institute that would eventually grow into the second largest institute of the Fraunhofer Society and the largest European solar research institution boasting more than 1,200 employees.

Numerous spin-offs of the ISE as well as service offices and organizations soon moved to this innovation-driven location: from a solar factory to the energy agency Regio Freiburg, from the consulting firm to solar architects, from the zero emissions hotel to artisan operations engaged in solar technology. In 1994 in Freiburg, the "Heliotrop" was the first plus energy building in the world, followed by the plus energy neighborhood "am Schlierberg" with the first commercial plus energy building, the "Sun Ship."

Sustainability in pharmacy and chemistry

While it is especially known for its solar research, Freiburg was and is also groundbreaking in other sectors of Germany. For instance, the University Clinic took a leading role in Germany in environmental medicine, hospital ecology and hygiene at an early stage. Closely affiliated with the University Clinic, the Viamedica Foundation for healthy medicine, whose goal it is to foster sustainable pharmacy and chemical practices and to safeguard patient as well as staff protection through environmentally conservative hospital hygiene, has been active in Freiburg since 2002.

In 2007, the Albert Ludwig University rolled out the Center for Renewable Energy (ZEE) as an interdisciplinary and faculty-spanning institution. It is the responsibility of the ZEE to bring together all scientific institutions tasked with renewable energy in research and teachings of the university as the central scientific organization.



At the old freight station

Five Fraunhofer Institutes in Freiburg establish the Sustainability Service Center

A vast variety of centers and faculties of the university are now part of Freiburg's environmental research. The Freiburg Material Research Center (FMF) and the Freiburg Center for Interactive Materials and Bio-Inspired Technologies (FIT) are engaged in material science and energy research beyond faculty boundaries. Objectives include the development of energy autonomous micro systems, i.e. solutions that do not need energy. They are for instance linked to medicine, e.g. in the form of mini fuel cells that use the glucose from the blood to generate electricity to be able to power pacemakers without batteries.

Many new institutions in the environmental research sector were developed in Freiburg. For instance, in October 2015, the Institute for Sustainable Technical Systems (INATECH) was established at the Technical Faculty of the university. It shows exemplarily what Freiburg understands interdisciplinary research to be. INATECH is backed by the Sustainability Service Center, which the university

built in partnership with the five Fraunhofer Institutes in Freiburg. The spectrum of topics they cover is very diverse: besides the Fraunhofer ISE as Freiburg's largest Fraunhofer Society institution, it includes the Institute for Short Time Dynamic (Ernst Mach Institute, EMI), the Institute for Applied Solid Body Physics (IAF), the Institute for Physical Measuring Technology (IPM) and the Institute for Material Mechanics (IWM). INATECH is expanding the research and teaching spectrum by adding engineering science-based sustainability research.

Now it offers a master and bachelor program under the title "Sustainable Systems Engineering." It focuses on sustainable materials produced in an energy and resource conserving manner. They provide the foundation for systems that make dependable renewable energy supply and its storage as well as efficient uses possible. The modern materials also safeguard the resistance and adaptability of systems. This is also called resilience vis-à-vis short and long term changes, such as natural disasters or climate change.

Natural resources

The University of Freiburg also became a science pioneer as a result of the professional advancement of ecological topics. Since January 2013, the Faculty for Environment and Natural Resources has existed in Freiburg with three large institutes (Forest Science, Geo and Environmental Nature Science, Environmental Social Studies and Geography). The central research object of the faculty is the analysis of interactions between human, society and the environment, in particular under the aspect of global change. This includes the sustainable use of natural resources and renewable energy, the protection of the basics of life (soil, water, air, biodiversity), the adaptation to global changes and the handling of natural risks and hazards.

Examples of the university's environmental research in Freiburg today are gradu-

ate degrees in subjects such as forestry and environment, geography of global change, environmental natural sciences or timber and bioenergy. Master courses in environmental governance and renewable energy management are also available.

Research centers for students

Up and coming talent must also be mentioned. The association Schülerforschungszentrum Region Freiburg e.V. (SFZ) has existed since 2017 and the City of Freiburg is one of its sponsors. In the region, the association has set up several institutions in which children and adolescents conduct research, experiment and develop outside of the classroom. These student research centers are bound to come up with ideas to improve the environment and many young people who participate may choose a career in science.



3.3 Environmental management

In Freiburg's economy – besides the medical and healthcare sector – energy and environment are two topics that play a major role. One important player in this segment is the Fraunhofer ISE, which acts as the incubator for different companies in the renewable energy field.

For a total of ten years, the business office of the cluster initiative Green City Freiburg, which is part of the Freiburg Wirtschaft Touristik und Messe GmbH & Co. KG (FWTM), has been networking the now 150 member companies and institutions. The focus of this regional network is on renewable energy, environmental technology, sustainable architecture, mobility as well as research and development.

A Freiburg style technology center – the Solar Info Center

In Freiburg's environmental management, the Solar Info Center (SIC) plays a key part. As a technology and service

center for renewable energy, the organization near the fairgrounds bundles a variety of competent partners for energy optimized planning, construction and management. It offers effective access to sustainable solutions that are ecologically and economically expedient. Forty businesses offer products and services at the competency center – from the local to the global energy revolution.

Creative space for young talent and "green" ideas

Another light house project that reaches well beyond the boundaries of Freiburg is the >Smart< Green Accelerator for young, innovative foundation projects with a lot of potential established in July 2017 by the FWTM with private incubator Grünhof. Besides the development of sustainable (tech) start-ups in the fields of renewable energy, environmental technology and retail, it fosters active collaborations between innovative enterprises and promising new businesses.

Installation of a photovoltaic system





Kreativpark Lokhalle

One unique company at the creative park Lokhalle Freiburg at the former cargo station is the international module Green Digital Activator. It is a start-up development program in which professors and students from Tel Aviv and Freiburg participate.

Hence, the city partnership between Tel Aviv-Yafo and Freiburg, which was officially sealed in 2015, gains an additional business dimension and quality beyond merely civil and cultural exchange.

From Wyhl via Freiburg to Munich and into the world

Freiburg has a long tradition of environmental management events. The protests against the Wyhl nuclear power plant ushered in a tradeshow for environmental products in the Kaiserstuhl, which grew consistently. In 1980, for space reasons, it relocated to Freiburg. Under the name Eco Fair it quickly attracted pan-European attention. From environmentally appropriate building materials to consumer products, it showed a wide range of items that were part of a fledgling eco business. By the

end of the 1990s, the concept of the Freiburg Eco Fair survived and the demand for specific technologies, in particular solar technology, rose. In 2000, the solar technology fair Intersolar, which had previously been hosted in Pforzheim, was brought to Freiburg and replaced as Eco Fair as an industry event. The Intersolar saw enormous growth on Freiburg's fairgrounds – from 7,000 to 35,000 square meters. It also won an international audience. With the still rapid growth of the solar industry, Freiburg also remained an interim stop.

In 2008, the Intersolar relocated to Munich. The internationalization strategy of the Intersolar also began in 2008 and resulted in dedicated events in the United States, China, India, Brazil, the United Arab Emirates and Mexico. Freiburg's Business Promotion and Fair Corporation FWTM with its own internationally active subsidiary FMMI (Freiburg Management and Marketing International) remained a cohost even after the departure from Freiburg and to date plays an important role in the organization of the global events.

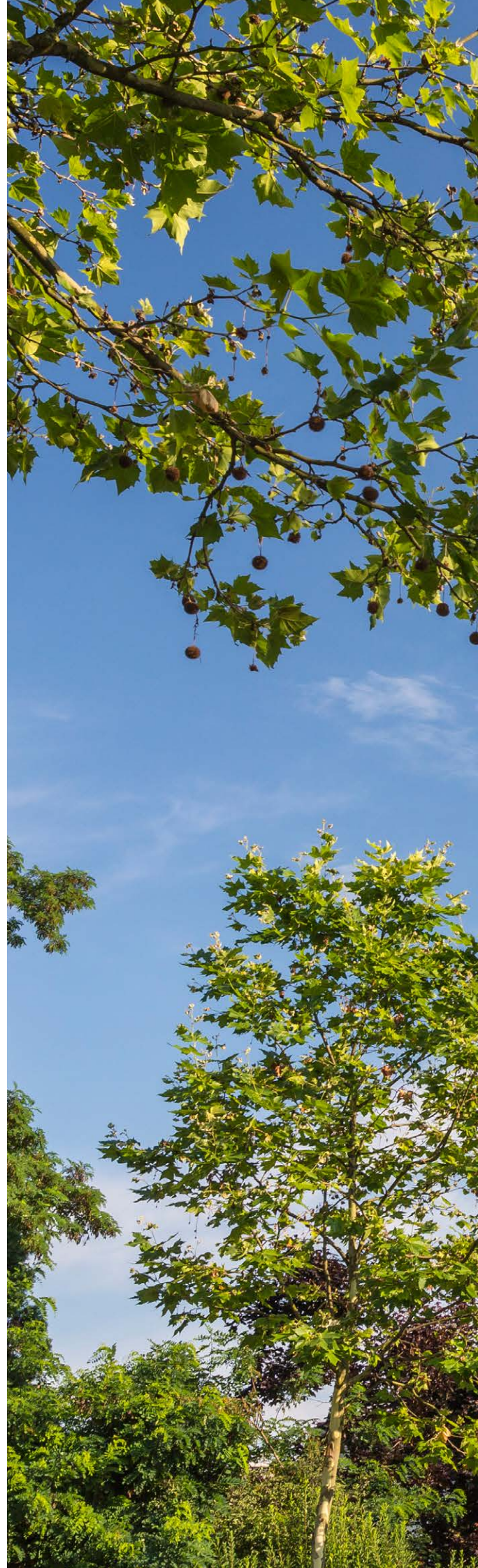
The growth of the Intersolar continued. In 2011, close to 2,500 exhibitors presented their products in Munich on 160,000 square meters, making it the world's largest solar business event. However, a phase of massive industry consolidation followed. The markets collapsed and many production segments were transferred to Asia. The industry, and the tradeshow, have once again been growing significantly for several years and is making content progress.

New products for construction sustainability – The GETEC

Upon the relocation of the Intersolar from Freiburg, the FWTM launched the new Gebäude.Energie.Technik (GETEC) tradeshow in Freiburg. It evolved into the leading tradeshow for energy efficient planning, construction and modernization as well as renewable energy and healthy living in the southwest of Germany.

Over the course of three days, every year it reaches a broad target group with a highly innovative market overview: private and commercial builders, real estate owners and enterprises funding construction, experts from the fields of architecture, planning, skilled trades and energy consulting as well as communal decisionmakers.

By now, the GETEC is considered the "energy revolution barometer" of the region, because it shows the latest developments, market trends and innovations from the region and for the region. More than 9,000 visitors from all over the southwest of Germany and beyond used the broad portfolio of energy consultations, product information and expert presentations in 2019.





3.4 Environmental tourism and city marketing

Inspirational stronghold – known internationally as an environmentally engaged city

Besides the idyllic nature in the Black Forest and in the Dreisam Valley, its historic old town and the scrumptious food scene in Baden, environmental topics bring a lot of visitors to Freiburg. More than 25,000 expert guests from about 45 nations come to the city each year. This is not because Freiburg offers spectacular large projects, but because of the large number of model projects and a broad spectrum of “green competency,” which is groundbreaking. Primarily, these are examples that encourage emulation and the expert guests like to see them. Hence, Freiburg is evolving into a stronghold of ecological inspiration. The most common question frequently is: Why did Freiburg embark on this journey so soon? The response is multi-faceted. Certainly, the prevention of the construction of the nuclear power plant

in Wyhl, which gave the region an ecological identity, played a big part in it. This was compounded by the creativity, the wealth of inventions and the spirit of trial and error, which Baden-Württemberg is known for. However, the attitude in Freiburg always had a lot of ecological undertones. Moreover, as a city that offers a high quality of life, Freiburg always attracted young people and they brought new ideas to the table. Hence, this university town steeped in tradition evolved into a modern workshop of the future, where one contemplates – innovatively and in the absence of dogmas – new concepts that reconcile savoir vivre, sustainability, ecology and economy.

Freiburg benefitted from its size time and again. A city researcher once called it a “purse sized metropolis” – small enough to change, large enough to be taken seriously. Around the world, especially in countries like China, South Korea

Business guests from Freiburg's South Korean partner city Suwon



and Japan, Freiburg has long been considered the green model city. Communities, business representatives, architects and urban planners all want to learn and profit from Freiburg's experiences. In particular Freiburg's appearance as a part of the Urban Best Practices Area during the World's Fair EXPO 2010 in Shanghai has boosted the international popularity. The industry tourists, who Green Map in hand embark on the Green-City-Tour through Freiburg on bicycles, are often pathfinders and door openers for "standard" city tourism and the attraction of companies. These special eco tours of Freiburg and its highly creative environs are organized by private providers.

City partnerships and networks carry environmental protection into the world

Today, Freiburg maintains twelve city partnerships and environmental policy issues are often part of the exchange. With Isfahan (Iran), solar collaborations are already underway, while Freiburg built Italy's largest photovoltaic system with its Italian partner city Padua. With Besançon in France, Freiburg has made an agreement as part of a convention to continuously engage in exchanges on sustainable urban development. With the Ukrainian City of Lviv contacts with the network of energy efficient towns in Ukraine have been established to bring the plans for houses and renewable energy up-to-date. Currently, the city administrations of Lviv and Freiburg are working on the implementation of a project sponsored by the Federal Ministry for Economic Cooperation and Development. In Lviv, this project calls for the energetic refurbishment of a multi-family home and of a school as model buildings. It also makes the first LED lighting in public areas possible.

In the fall of 2017 in Wiwilí (Nicaragua) a project for the improvement of drinking



Viewing of a photovoltaic system in the city center

water supplies in rural areas was completed. Tel Aviv and Freiburg are collaborating on a concept and the planning of new city quarters and are sharing their experiences in the mobility sector as well as with the foundation of start-ups. Last, but not least, the South Korean partner city Suwon and Freiburg are joint advocates in the Eco Mobility Alliance, a global network of cities that aims at sustainable mobility.

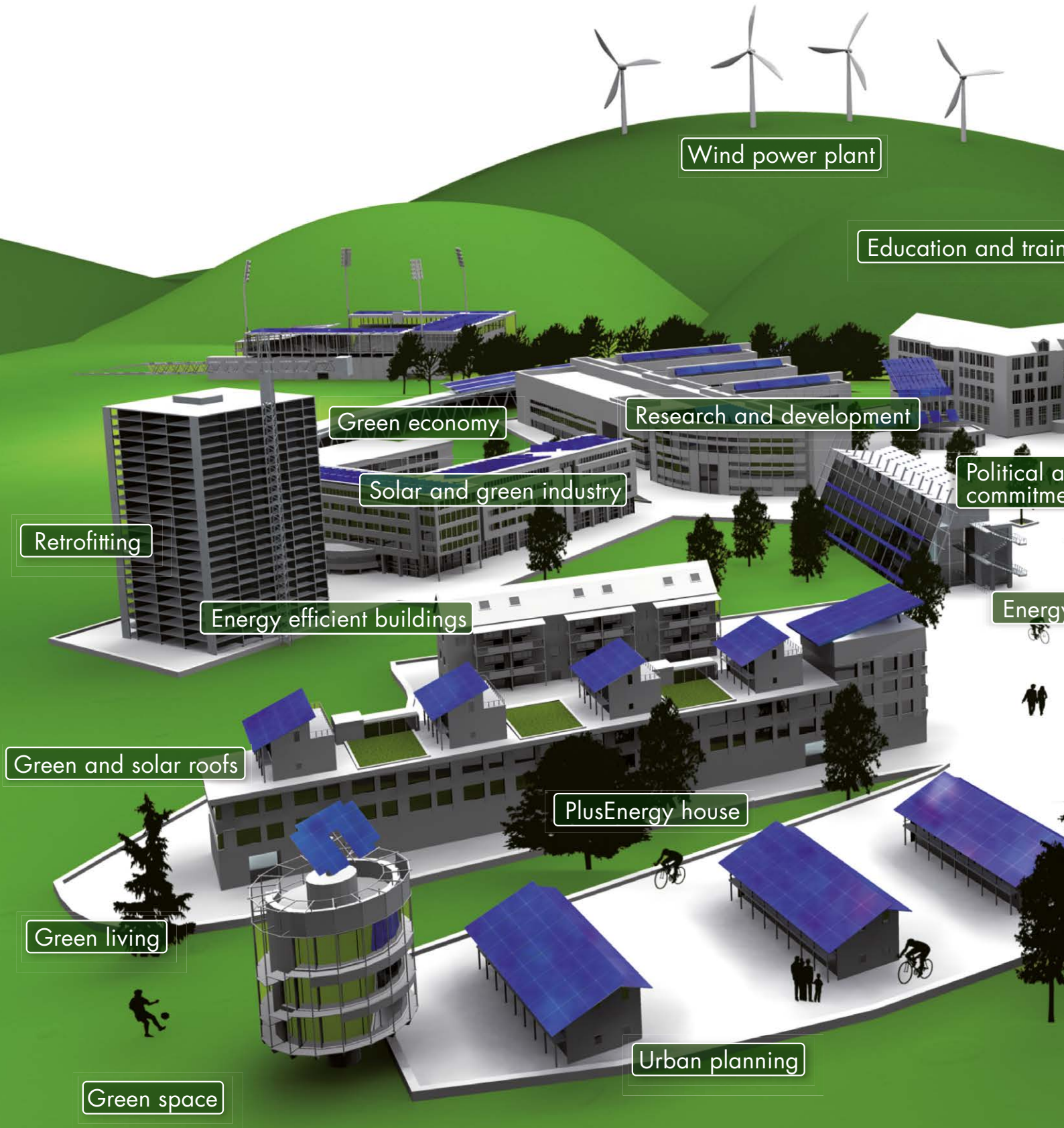
In conjunction with the International Sister Cities Conference eleven of Freiburg's twelve partner cities met for a joint conference in October 2018, to discuss the local implementation of the UN sustainability goals. The international network of city alliances on sustainability comes together in Freiburg either way: since 1991 the European Secretary of the International Council for Local Environmental Initiatives (ICLEI) has had its seat here. The many activities of the ICLEI also include the Local Renewables Conference, which has been hosted in Freiburg eight times since 2007.

Freiburg is also a member of the European Green Capital Network, which was established in 2014. It serves as the platform for the exchange between cities on

topics such as climate protection, recycling, green zones in cities and sustainable mobility. In November 2018, 20 cities, Freiburg among them, passed a “call for action,” suggesting to cities around the world to become more sustainable through the creation of a “green movement” to develop even greater resilience against climate change.

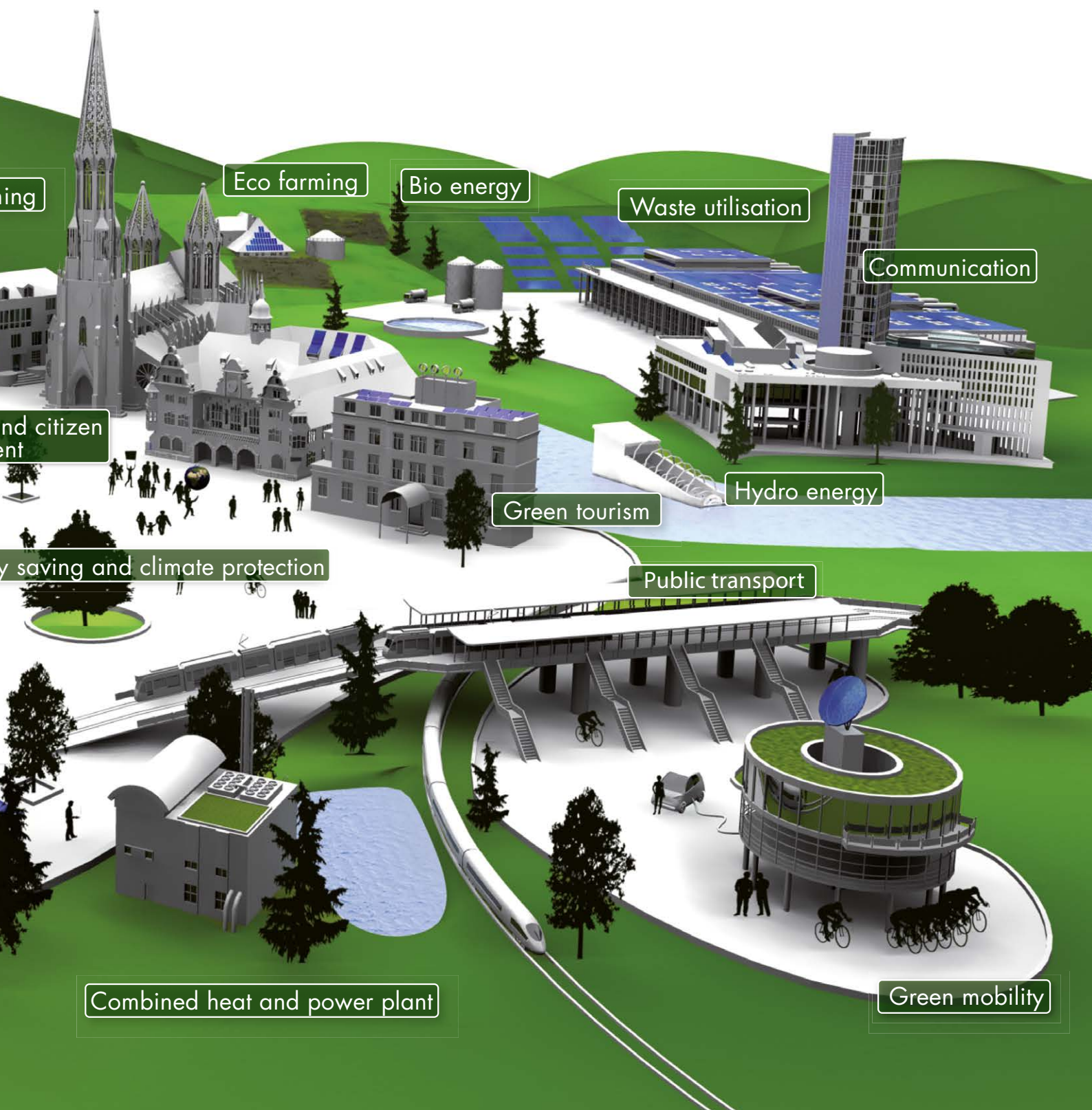
Being good at it is not enough – the world must find out

With the Green City Office in the Department for International Contacts, Freiburg, in cooperation with the Freiburg Wirtschaft Touristik und Messe GmbH & Co. KG (FWTM) has created a central point of contact for all business visitor groups from Germany and abroad.



There, they receive information on sustainability programs in Freiburg. Customized visitor programs are organized. To that end, the Green City Office works with outside service providers. Official "Partners of the City of Freiburg i.Br. – Green City" for sustainable discovery tours all across the city and the region are Aiforia, Freiburg Future Lab, Innovation Academy and OSM Maeda as contacts for Japanese delegations.

On behalf of the city, more than 170 FWTM employees are engaged in the promotion of business and tourism. They also manage tradeshows and congresses, the operation of event venues as well as large and regular events. Since its establishment in 1987, the responsibilities of the FWTM have been expanded step-by-step. Full of ideas, flexible and efficient, it contributes to the positive development of the city and the region.



3.5 Citizen advocacy for the environment

Volunteering for the protection of nature

About a third of Freiburg's population volunteers in one of the more than 1,800 associations for the common good or in one of the countless initiatives and groups. Surveys confirm that another third of the citizens is highly interested in such advocacy. However, information and contact options are frequently not available. Many volunteer activities pertain to the protection of nature and the environment.

Popular – adopting a creek in front of one's house

Creek adoptions are particularly popular. Since 1986, Freiburg's citizens have engaged in such adoptions and assume responsibility for a concrete piece of their local environs. About 50 groups consisting of kindergartens, schools, associations and individuals now participate in the initiative.

In joint projects, participants get to intensively know a piece of nature and also pursue the objective to improve the ecology on site. The assignments are diverse: sometimes the group cleans the creek, other times the volunteers check the water quality or remove plants that are not appropriate, for instance invasive neophytes, i.e. types of plants that do not have their natural habitat in Germany. They upgrade the habitats of special flora and fauna, work in cave brooder, amphibia and dragonfly protection or take creative environmental action in artistic efforts.

Water pedagogic well founded training and accompaniment is extremely im-

portant. The project is supported by the Förderverein Bachpatenschaften Freiburg e.V., which also provides the creek adopters with free compatible tools.

Mowing meadows, caring for trees, using green zones as gardens – "Freiburg packt an"

Project "Freiburg packt an" (Freiburg does it) is also well-known and popular. In 2003, the Garden and Civil Engineering Office rolled out the initiative. Since then, participants have been developing project ideas on the city ecology under the joint label and they implement them. Annual projects with changing focal points that can be adjusted to new circumstances, are also available. "Freiburg packt an" is always open to new ideas from activists; the Garden and Civil Engineering Office helps with the implementation.

For instance, volunteers were able to assist with the ecological high grass mowing project, which requires city green zones to be mowed less often than in the past, which makes them more habitable for insects.

Other joint activities include measures to mitigate the chestnut weevil. Citizens stuff chestnut leaves into closed bags. Freiburg citizens also combat the ambrosia plant proliferation, which can trigger strong allergic reactions. Moreover, they have the opportunity to adopt a park, playground, the Old Cemetery, the youth traffic school or other properties temporarily, for one to two years. For the small space ecology, project "Freiburg blüht auf" (Freiburg in Bloom) is particularly enriching. Citizens take care of the

tree disks in front of their homes and render them green. Wildflower seeds and planting material are provided by the Eco Station.

Kick-off event for
„900 Years - 900 Tree Beds“
with Mayor Martin Horn







Legal information

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Graphics, layout & typesetting: Pfeffer & Stift GmbH, www.pfefferundstift.de

Printer: schwarz auf weiss – litho und druck gmbh, www.sawdruck.de

Printed on 100% recycled paper.

Print volume: 300 copies

Photos/images

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