

# Freiburg im Breisgau, Germany

## Long-term strategies for climate protection in Green City Freiburg

A city with a long history of environmental awareness and action, Freiburg, a renowned solar – and green – city, has been systematically addressing the issue of climate change. Their first energy action plan was issued in 1986 and with its newest edition, the Climate Protection Strategy 2030 aiming for a 40% CO<sub>2</sub> reduction by 2030, climate change mitigation becomes a long-term priority for the city administration and citizens.

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### Abstract

In 2007, the City Council of Freiburg reaffirmed the need to intensify climate change mitigation actions at community level, viewing this as part of its local and global responsibility. Building on previous actions and results, the Council set a new carbon dioxide (CO<sub>2</sub>) reduction target – a 40% reduction by 2030 on the baseline year of 1992.

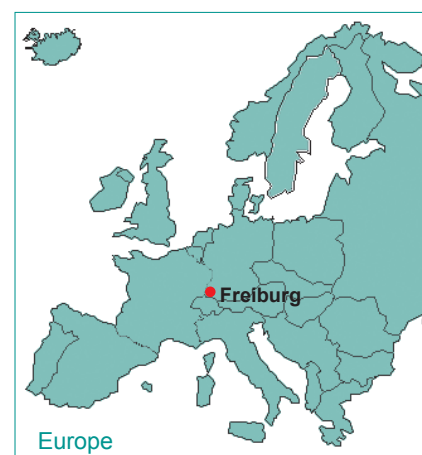
The City of Freiburg used both in-house and external expertise to assess community greenhouse gas (GHG) emissions and the impact of measures implemented up to 2006. Based on the results of this periodic assessment, a range of new scenarios were developed to provide the City Council with concise information and a range of options to be considered. The Council selected the most ambitious scenario proposed, in order to advance more rapidly in the area of climate protection.

The new Freiburg Climate Protection Strategy 2030 provides a clear focus and wide-ranging framework for local action in key areas identified for effective GHG emissions reduction. The city's focus is now on achieving the new target, with the support of an action plan, a structure established to support the implementation process and engaging its citizens.

### Importance of the Issue

There is growing realisation globally that climate change mitigation action is crucial and that it can be handled effectively at community level – particularly in the light of increasing urbanisation (an estimated two-thirds of the global population will live in cities by 2030). Already today 80% of all energy generated is used in urban centres in Europe. By changing the way energy is produced, distributed and used in cities and towns, moving towards sustainable energy, the release of GHGs into the atmosphere can be drastically reduced, and so minimise the human impact on climate change.

As the closest level of governance to citizens, local governments can **guide**, **motivate** and **lead** their community in addressing climate protection. To support this, ICLEI's Cities for Climate Protection™ (CCP) Campaign provides a framework for action and support to local governments to reduce the local



#### Population:

± 220,000 (2007)

#### Land area:

150 km<sup>2</sup> (of which 40% is forest area)

#### Municipal budget:

810 million Euro (2008)

causes of global warming and air pollution. The use of a process with clear milestones (see box below) can be applied to achieve GHG reductions across many different sectors (energy, transport, buildings, waste, etc.). As a cyclical approach, it recommences once all five steps have been completed, with new ideas and improvements building on previous actions. Freiburg, a CCP participant since 1993, mirrors this approach in its climate protection activities.



#### The CCP 5 milestones are:

- (i.) Conduct a baseline emissions inventory and forecast
- (ii.) Adopt an emissions reduction target for the forecast year
- (iii.) Develop a Local Action Plan (LAP)
- (iv.) Implement policies and measures
- (v.) Monitor, verify results, evaluate and report.

## Case

### Context of Municipality

Freiburg im Breisgau is a medium-sized city situated in Southwest Germany, close to the Swiss and French borders, in the Federal State of Baden-Württemberg. This well-known city in the Black Forest region has developed an identity as a “Solar Region” and since 2008 also profiles itself as a “Green City” – moving beyond the concept of a solar city to also reflect other issues impacting on sustainability and high quality of life.

Freiburg’s climate protection approach is influenced by the following: the city has the highest level of solar radiation in Germany; about 70% of the city’s building stock is old and provides a challenge in energy efficient renovation; the city’s economic activity is centred around the service sector (57%). Freiburg attracts visitors from around the globe to learn from its numerous good practice examples – from energy to transport, from buildings to waste management.

### Case Description

This case study describes the City of Freiburg’s implementation of the cyclical CCP milestone process, and the advances it has made in climate protection and sustainable energy implementation. Lord Mayor Dr. Dieter Salomon reaffirmed Freiburg’s involvement in the CCP Campaign in 2006, with climate change adaptation added to the city’s focus. Freiburg also joined the Local Renewables Initiative to share developments in the field of sustainable energy with other initiative partners.

The city’s 2007 adopted CO<sub>2</sub> reduction target and the linked strategy and action plan are in line with recent developments in both Germany and the European Union (EU), where climate protection has been identified as a priority for the next decades.



An ICLEI Initiative

In the Local Renewables Initiative the City of Freiburg shares its experiences on the local generation and use of renewable energy, in combination with energy savings and efficiency.

## 1. Starting position

Since the 1970s Freiburg and its inhabitants have been concerned with sustainable energy. A starting point was the intention to move away from nuclear energy towards the use of renewable energy sources (RES). An energy supply concept was developed in 1986, starting the transition process – a first step in climate protection. The first Climate Protection Action Plan was adopted in 1996, with a target of 25% CO<sub>2</sub> reduction by 2010. This was revised in 2002, and an additional target was set, namely to generate 10% electricity from RES by 2010. Throughout this period, the involvement of local citizens, politicians and the business sector has been an essential factor in the Action Plan's development and implementation process.

A GHG inventory carried out in 2007 demonstrated that 80% of emissions originated from energy use in households, industry and from smaller users, while nearly all the remaining emissions came from the transport sector. Total CO<sub>2</sub> emissions for the city were around 1.9 million tonnes (t) per year. By 2007, the city had reduced its CO<sub>2</sub> emissions by 14% (baseline: 1992). In the same timeframe the per capita emissions were reduced with 20% to 8.5 tonnes per person (German average 10.8 t).



Photo: City of Freiburg

Co-generation plant running on wood chips providing heat and electricity for the Vauban district

### Up to this point the most effective measures implemented to reach these initial reductions included:

- Switching to 50% co-generation for electricity and heating in the city. Large and small combined heat and power (CHP) plants were built, running on gas (e.g. from methane captured in landfills) or wood chips.
- The development of new low energy city districts – Rieselfeld and Vauban – designed with sustainability in mind, have integrated transport plans and buildings designed to reduce energy demand. The effective use of passive solar energy in buildings – for heating / cooling, natural lighting and ventilation – is illustrated by many exemplary building designs, including those constructed to the passive house standard.
- The integrated transport system was extended, linking non-motorised mobility (walking and cycling paths) to public transport options (bus, tram, train). Disincentives, such as a car-free city centre with limited and expensive parking availability around the city centre, were also introduced to encourage behaviour change.
- Active solar energy systems – photovoltaics (PV) to generate electricity and solar thermal systems for hot water – were installed on private and municipal buildings, as well as the local soccer stadium. By the end of 2008 installed PV produced 11,3 MW, approximately 1 % of Freiburg's electricity needs. Citizens were provided a free Internet-based tool, FREE-SUN (Freiburgs Erneuerbare Energie: Sonne – [www.freiburg.de/freesun](http://www.freiburg.de/freesun)), to determine the potential for solar energy on roofs – calculating direction, angle and shading. Financing mostly came from investments of local citizens and businesses, small support grants from government and other sources, with the German Feed-In Law<sup>1</sup> providing an added incentive.
- A small proportion of small hydro (water) power, biomass and wind energy were also added to the local energy mix.

<sup>1</sup> The German "Stromeinspeisungsgesetz" (Electricity Feed-in Act) of 1991 gave important impetus for the expansion of renewable energy sources. It was replaced by the "Erneuerbare-Energien-Gesetz" (Renewable Energy Sources Act) in 2000 and amended in 2004 – more details on [www.erneuerbare-energien.de](http://www.erneuerbare-energien.de)

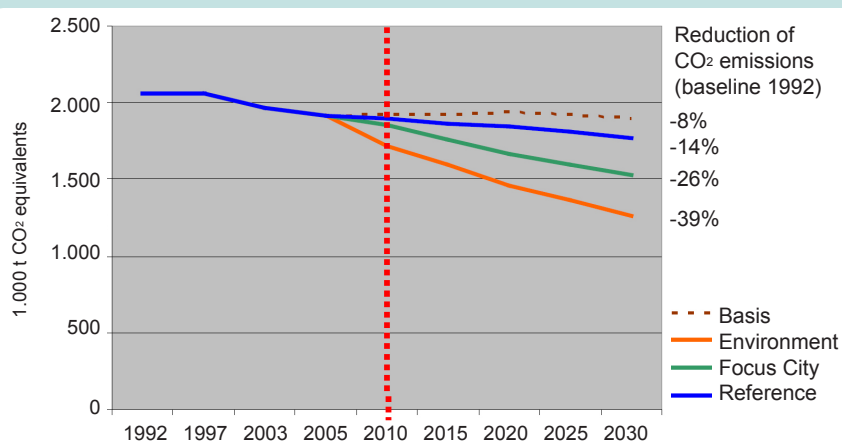
Despite the range of actions and reduction in GHG emissions, it was at this stage also clear that the city would not reach 25% CO<sub>2</sub> reduction by 2010, but rather a reduction in the range of 15-20%. The regular review identified this development, leading to a re-assessment of the strategy and the identification of problem areas.

## 2. Basis for decision – the new climate protection study

In 2006, a study was commissioned by the City's Environmental Protection Office to verify the results of Freiburg's climate protection concept of 1996, taking into consideration the developments of 2005. As part of the study, scenarios running until 2030 were developed to guide the discussions and provide clear information for the local political decision-makers in this process. The study was conducted by the Öko-Institut in Freiburg, compiled in close cooperation with the Energy Agency Regio Freiburg, and with input from various departments of the City. It addressed the following:

- A review of achievements accomplished up to 2006, as well as reviewing the previous target of a 25% CO<sub>2</sub> reduction by 2010.
- Four scenarios running until 2030 on the projected energy use of households, municipal buildings, universities and university hospitals, industry, services and transport, and also illustrating potential CO<sub>2</sub> reductions that could be reached in Freiburg (based on certain assumptions).
- An action plan that describes fundamental fields of action, as well as single measures in local climate protection. These include 63 action oriented measurements, also taking the priorities in terms of cost-benefit ratio and expenditure of time into account.

### Greenhouse gas emissions – Comparison of the scenarios





### 3. Setting a new target and adopting a new strategy

The study results were used as a basis for the decision by the City Council in its deliberations towards mid-2007. There was general cross-party consensus in the Council in June 2007 that climate protection would remain a local responsibility and priority, also recognising that community climate protection has an important impact on the local economy in terms of investment potential.

A new ambitious target was set; to achieve at least a 30% CO<sub>2</sub> emissions reduction, but to aim for 40% in the community by 2030 (previous target: 25% by 2010, baseline: 1992).

To achieve this new target a new climate protection strategy and action plan were agreed on. A strong focus was placed on energy conservation, followed by energy efficiency, renewable energy and transport. The strategy also examined the motivations of many different actors in the community to discover how best to encourage their engagement in climate change mitigation actions and to ensure a fundamental course of action to ensure that the target is reached.

### 4. Details on the action plan

Based on the selected scenario, the aim was to build on successes already achieved, to intensify action in fields with a high potential for GHG reduction, and to work in a much more structured manner within the administration – also in cooperation with all important stakeholders in the city – to achieve faster results.

#### 4.1 Main fields of action:

- *Energy savings in existing buildings, new districts and city owned buildings.*
- *Energy efficiency measures and technologies, in particular in the area of co-generation of electricity and heating (or cooling) energy in the building and commercial/industrial sector.*
- *The use of **renewable energy sources (RES)**, in particularly solar energy (high radiation potential in Freiburg) as well as bio-energy, with a focus on using biomass and capturing methane from landfill.*
- *Traffic infrastructure, focusing on energy efficient street lighting and extending the integrated transport concept.*
- *Awareness raising and information to encourage community engagement (e.g. Internet-based citizen CO<sub>2</sub> diet programme with calculator; cultural information programme).*



Photo: triolog

Not just using PV, this multi-family housing building in Wilmersdorfer street was retrofitted to reduce energy demand, with thermal insulation, as well as district heating in combination with solar thermal and PV.

Some examples of action planned include:

- **Combined heat and power (CHP) plants in public buildings and schools:** Co-generation plants for public buildings and schools will ensure improved heating using RES – mainly installing small plants.
- **Buildings:** A strong emphasis will be placed on electricity savings in municipal buildings, making Freiburg a role model in this context. The Council made at least 2 million Euro available for energy efficient renovation of municipal buildings and to achieve the Passive House standard for new municipal buildings. There is also a programme for private buildings. The payback time for investment costs is expected to rapidly decrease with rising fossil fuel prices. In 2008 the City Council adopted a two step strategy towards building passive houses (2009/2001) – on municipal land and new city quarters.
- **City planning:** Early consideration of energy aspects for new city quarters, e.g. passive solar aspects in the planning stadium, energy supply by heating grids, co-generation and/or renewable energies.
- **Public awareness and engagement:** The “Co<sub>2</sub>libri” (CO<sub>2</sub> free!) public awareness campaign started in March 2009 and will be further extended, with the aim of mobilising and engaging citizens on a continuous basis, to reduce energy consumption. The intention is also to identify areas where behaviour change can be encouraged and to improve private investment in climate protection activities.
- **Integrated urban transport:** The promotion of non-motorised mobility, in particular bicycle and pedestrian traffic, is a preferred area for action. The aim of the urban transport development plan 2020 is to highlight the integrated public transport options, reducing the need for motorised transport.

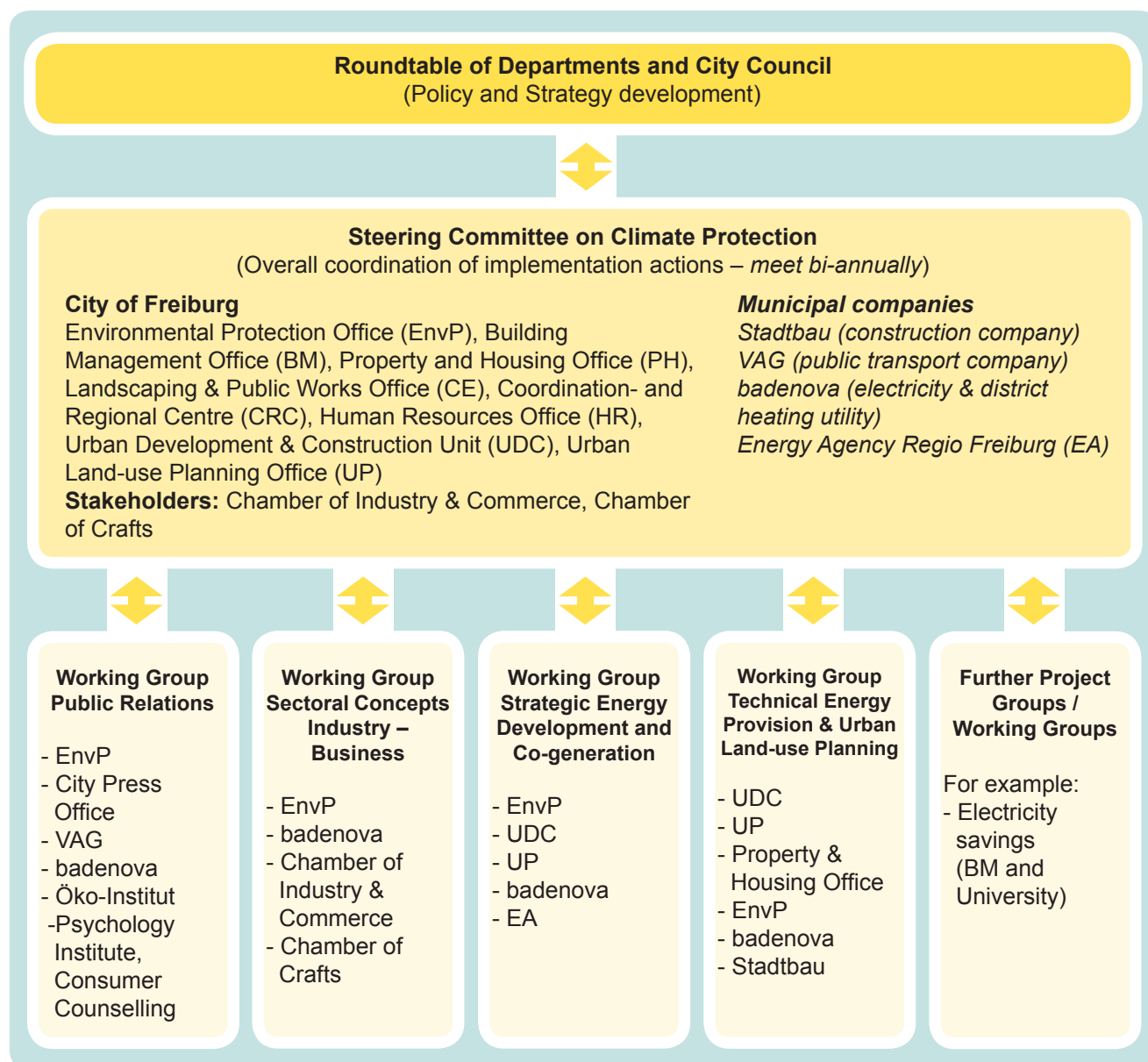


Photo: Maryke van Staden

Citizens need options: Freiburg links tram, train, cycling and pedestrian solutions.

## 4.2 Organisation within the City administration:

The city administration and relevant partners are organised in a three-tier structure, splitting policy and strategy, implementation management, and sectoral planning. The structure is presented below.



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The concept was developed to be inclusive, involving all key departments and organisations. The policy and strategic development is addressed by a roundtable of the City Council and departments involved. A Steering Committee, comprised of the departmental heads, as well as senior representatives of key municipal companies, ensures overall co-ordination of the implementation actions. They meet twice annually, and work under the guidance of the Environmental Protection Office (EPO).



### 4.3 Finances and manpower:

The city administration intends to develop a ‘measures package’ for each two-year budget plan, to be presented to the City Council for approval. This will form the basis of a 10-year action plan, which highlights middle to long-term perspectives.

From 2008 onwards, 10% of the concession levy – around 1.2 million Euro annually – generated from payments by the local utility company badenova to the city for the use of its electricity grid, will be used for the implementation of climate protection measures. These funds will in particular be used for the energy efficient retrofitting of municipal buildings and infrastructure improvements. Depending on the general financial situation of the City, an additional 2 million Euro per year will be added to this amount for climate protection measures.

### 4.4 Review process:

To ensure that monitoring is properly handled, the Council required that a climate footprint be conducted every two years, including a check of all scenario calculations, to identify achievements, developments and potential problems. This will then be used by the Council to base future decisions on.

As the involvement of citizens and businesses in the climate protection is crucial, their involvement in the implementation process, and potentially also in the review process, is being considered – the Co<sub>2</sub>libri campaign may be a suitable vehicle for this.



Photo: Triolog

Sustainable education offer: Renewable Energies  
in education and as an extracurricular offer



## Results

Over a period of 30 years, Freiburg has built up an impressive range of expertise and implemented excellent and diverse examples in the field of sustainable energy – from district heating to waste management, from buildings to transport. Experiences continuously feed into the process, which also supports the development of community climate protection activities.

Starting with a focus on RES and building on experiences, continuity of processes and coherent organisation within the local administration helps to deepen the climate strategy and intensify actions in the medium to long term. Regular monitoring of GHGs and reporting results helps decision-makers identify next steps.

Thus far, the involvement of local stakeholders has been a key point for success. Community engagement is increasing (from an already active citizenship) and different local stakeholders are involved in specific actions and projects, eager to share their experiences and approaches. In this way, they help to showcase the city, reap the ensuing economic benefits (e.g. from eco-tourism) and help to motivate others to intensify local action to achieve success in climate protection.



Photo: City of Freiburg

Energetic building standards:  
Passive housing in Vauban with  
low heat and energy consumption

## Lessons Learned

Consensus among the City Council that local climate protection remains a priority on the agenda, has ensured continued financial support and strengthened the overall implementation process.

The role of a key political promoter – in this case the mayor – has helped to focus attention on this issue and mobilised people from various groups to engage. An inclusive approach is necessary to interest and mobilise a wide range of stakeholders.

Transparency in decision-making is crucial – not only for politicians and municipal staff, but also for the public.

In-house expertise is essential to ensure the development of a comprehensive strategy and action plan, although this can also be conducted with external support.

An inventory and monitoring system, which can help to identify effective actions and priority areas for GHG reduction is an essential tool to assist discussion and decision-making. In this context the development of a range of scenarios to help decision-makers is also useful.

A clear structure is necessary to include all relevant departments, utility companies and other key organisations, under the guidance of a single

strategic department or unit that has the mandate to coordinate community climate protection – within the municipality as well as with third parties. This coordinator working in cooperation with the rest of the group will help to set clear targets and develop an action plan that will ensure a vision, a clear direction and an adequate budget. It is necessary to include the financial administration and several other key departments such as urban development, construction, transport, etc.

It is important to focus on advantages for all to create a common purpose. To alleviate potential tensions, make it clear that climate protection is not the only concern, albeit a priority, of the city. Identifying other supportive issues will strengthen the group cohesion.

City administrations cannot work in isolation to address climate protection. Diverse local stakeholders, e.g. utility companies, private households, small businesses, etc. must be involved. In addition to this national framework conditions, such as excellent building standards, should underpin efforts.

Financial incentives remain a primary instigator of behavioural change.

At this stage the focus is still on voluntary action, and a clear message should be sent to citizens to call for their engagement in climate change mitigation activities, with concise information to motivate them to act and examples of

what they can do. The city administration must build trust with its citizens, putting them at the centre of the climate challenge. By giving recognition and acknowledgement where due, and communicating regularly with the press to send positive messages, much can be achieved.

It is useful to make clear action arrangements to clarify the tasks of different actors, and so ensure that a comprehensive, integrated process exists. This should be done early in the planning process, to ensure that all actors feel that they have had a real chance to contribute.

Energy aspects in particular are often considered too late in the planning process. The inclusion of energy actors – from the building industry, potential building owners, the energy suppliers, urban planners, etc. – is essential in early discussions.

One element that has supported the successes achieved thus far is the interest of Freiburg to learn from other good examples around the globe. This helps to provide continuous impetus and new ideas – from communication to new mitigation actions or ways to improve integration of stakeholders and functions.



Photo: Fesaa

Renewable energy in Freiburg:  
Five windmills produce electricity  
for nearly 6.000 households

## Key Replication Aspects

All of the above should be considered as potential replication aspects, in the specific context of the city or town. Further to this a number of aspects are highlighted below:

- Focus on exemplary local projects that can help to build a local Climate Strategy and Action Plan. Starting with small steps and perseverance can be very effective. The CCP five milestone process can help to move forward step-by-step, with a climate action cycle that includes regular evaluation to help the next phase of informed decision-making.
- A decision by the Council – preferably unanimous – that climate protection is important will mean continuity in direction and placing climate protection above party politics.
- It is important to carry out a complete GHG inventory, to track GHG reductions and identify reduction potential. Expertise will improve as this is repeated. Yet, even without a baseline inventory there is still much that can, and should, be done. Then start with an estimate on main GHGs and focus on these areas with mitigation action.
- The City Council must lead the process, but it must also act. To engage the whole community it must show that the municipality is also committed and active, changing its own energy uses (e.g. green fleets, green energy). When addressing community involvement the use of incentives and disincentives can be useful.
- Use peer-to-peer exchanges and seek support from the national, regional and international levels. There is available expertise and good ideas abound. These need to be translated and applied into the local context. It also encourages and motivates politicians and staff involved in this challenging field of work.

## Date Written

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\*taking over from the  
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## References / Sources

- City Council decisions of 2004 and 2007
- City of Freiburg:  
[www.stadt.freiburg.de](http://www.stadt.freiburg.de)  
[www.solarregion.freiburg.de](http://www.solarregion.freiburg.de)  
[www.freiburg.de/statistik](http://www.freiburg.de/statistik)
- Images:  
badenova, triolog

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Local renewables – local generation and use of renewable energy, in combination with energy savings and efficiency in urban environment.



ICLEI's CCP Campaign provides communities with a framework for action to address climate change mitigation and adaptation.



The City of Freiburg is a ICLEI member, CCP participant and partner in the Local Renewables Initiative.

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