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# Freiburg in a pathway towards a sustainable city

## Description of Freiburg's environmental awakening and climate policy measures

1

The German City of Freiburg, with its ca 220 000 inhabitants, has profiled itself as a sustainable city driving actively down its CO<sub>2</sub> emissions by regulation, incentives, design, long-term commitment and policy reform. Freiburg's specific target areas include energy (i.e. in buildings, private households and businesses, and in industry), and transport.<sup>1</sup>

Freiburg's sustainable policy has its roots in local nuclear power opposition in the 1970s<sup>2</sup> and its newly-politicized residents, which started to campaign for environmental solutions to the city's energy needs – consequently a network of environmentalists, businesses and research organizations were founded driving the sustainable city agenda forward. The local council responded positively by adopting a series of ambitious environmental energy policies.<sup>3</sup> In 1986 Freiburg was one of the first German cities to adopt a local concept of energy supply in order to protect the climate<sup>4</sup>. The three key pillars for future development in Freiburg became energy saving, new technology and renewable energy sources<sup>5</sup>.

Freiburg has branded itself as the Solar Region. At the end of 2006, Freiburg had an overall solar module electricity generation capacity of 8.6 MW and over 12,000 m<sup>2</sup> worth of solar-thermal collectors to capture heat from the sun. In 2006 alone, 2 MW of new solar energy capacity was installed.<sup>6</sup> Freiburg is one of Germany's sunniest areas, with 1800 hours of sunshine a year, but it only receives 1,117 kWh per square meter of solar radiance, which is lower than southwest England, and about the same as most of England and western Scotland.<sup>7</sup>

In addition to Freiburg's solar activities, the city has had several other environmental initiatives. A cycling plan was drawn up in 1970, and the city has over 500 km of bicycle paths. One third of all journeys are by bicycle. There are more than 5000 bicycle parking spaces in the city, with more at tram stops for "bike and ride" commuters. The old town centre became car-free in 1973, and in 1990, 30 kph-zones were introduced for almost all residential streets, except main roads. Freiburg introduced a low-cost flat-rate monthly "Environment ticket" for the region-wide bus service in 1991. In 2004 and 2005 two major new tram lines were opened, one from the city centre to the ecodistrict Vauban. In the new district of Vauban, around 30-35 % of the residents have chosen to live without a car. Freiburg has also put 42 % of its surrounding area under nature or countryside protection, where building is no longer permitted.<sup>8</sup>

<sup>1</sup> [http://www.c40cities.org/bestpractices/transport/freiburg\\_ecocity.jsp](http://www.c40cities.org/bestpractices/transport/freiburg_ecocity.jsp)

<sup>2</sup> There was a major protest, with widespread civil disobedience, and in 1975 the plans to construct a nuclear power plant were defeated

<sup>3</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.

<sup>4</sup> <http://vorort.bund.net/suedlicher-oberrhein/freiburg-environment-ecology.html>

<sup>5</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.

<sup>6</sup> [http://www.young-germany.de/671.html?&cHash=cef2a2e378&tx\\_ttnews%5Btt\\_news%5D=826](http://www.young-germany.de/671.html?&cHash=cef2a2e378&tx_ttnews%5Btt_news%5D=826)

<sup>7</sup> <http://madisonfreiburg.org/sustainablecity.htm>

<sup>8</sup> <http://madisonfreiburg.org/sustainablecity.htm>



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## Key challenges in implementation and drivers/reasons of success

Freiburg's main reasons for success can be found in its citizen's engagement and the city's comprehensive policies aiming at sustainability. Dedicated people have been involved in setting up, among others; the several times awarded BUND-Ökostation [ecological centre] in Freiburg. The citizen's engagement in environmental politics over the past decades has been estimated profitable both ecologically and economically.

Leading research institutes of solar technologies are based in Freiburg, as well as a multitude of small and medium-sized companies dealing in various ways with the promotion and application of regenerative energies. The low price environment ticket for the local public transport in 1990 was introduced after bicycle demonstrations and other forms of protest by local people. The city and region has systematically invested<sup>9</sup> in the promotion of other environment-friendly means of transport.<sup>10</sup>

The city's policies and actions have included an emission reduction target in 1996 to reduce CO<sub>2</sub> emissions to 25% below the 1992 level by 2010. In addition, the city has a support program for home insulation and energy efficiency retrofits and demands that all new houses build on city land must meet a new low-energy efficiency design standard that uses two thirds of the legally permitted limit.<sup>11</sup>

In 2002, the city council set a target for 2010 that 10 % of all energy consumed in the city should come from renewable energy sources. In addition, Freiburg will strive to lower its overall energy consumption by 10 percent. In order to lower its energy consumption and continue the push to stop global warming, Freiburg has introduced several energy efficiency initiatives. In 2006, the city launched a website where users can calculate the electricity savings potential hidden in their household.<sup>12</sup>

Freiburg City also actively promotes the transfer and synergies of technology and ideas. Although the city does not always have financial means to implement projects, it can work very effectively by bringing in different actors to jointly implement projects, activities and strategies in the area of energy and the environment.<sup>13</sup> Freiburg and its region has undoubtedly been aided by the national EEG or, "feed-in" energy policy<sup>14</sup>. Although this is not a distinctive factor of Freiburg, it is this

<sup>9</sup> The costs of Freiburg's initiatives are hard to define, as there have been numerous different projects over the years. In addition, projects have been implemented by several actors, who have all invested or co-financed in different ways. Each organization has their own way in calculating environmental costs. Hence, annual spending is impossible to define. Thomas Dresel, Stadt Freiburg 3.6.2008

<sup>10</sup> <http://vorort.bund.net/suedlicher-oberrhein/freiburg-environment-ecology.html>

<sup>11</sup> <http://madisonfreiburg.org/sustainablecity.htm>

<sup>12</sup> [http://www.young-germany.de/671.html?&cHash=cef2a2e378&tx\\_ttnews%5Btt\\_news%5D=826](http://www.young-germany.de/671.html?&cHash=cef2a2e378&tx_ttnews%5Btt_news%5D=826)

<sup>13</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.

<sup>14</sup> German Law on Renewable Energy (Das Erneuerbare-Energien-Gesetz, EEG 2000)



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interaction of local conditions with this national framework that has helped produce convincing track record.<sup>15</sup>

However, there have been several challenges in creating the pathway towards sustainability. For example, in the beginning of the 1990s an influential incineration lobby won a victory for incineration plants instead of recycling treatment plants. Another ecological challenge is the usage of land which still increases significantly. Freiburg's environmental reputation is attracting population but at the same time leads to a vast usage of land, splinter development and disfigurement of the landscape along the Upper Rhine. The city and the region also suffer from the increasing transit traffic through Freiburg and on the European North-South route. In addition, the overall share of sustainable energies used in Freiburg is still small.<sup>16</sup> Solar PV and other renewables still only provide less than 5 % of the power that Freiburg needs. The city generates 50 % of its electricity from natural gas CHP plants, and the rest is imported, including 30 % from nuclear. Freiburg's goal is to decrease nuclear's influence, and increase the energy from renewables to 10% by 2010. This cannot be achieved by PV alone, so the city is looking at obtaining more energy from biomass and from wind power.<sup>17</sup>

### **Assessment of CO<sub>2</sub>-emission reductions and if available any preliminary estimates of emission reduction costs (euro ton/CO<sub>2</sub>ekv)**

While in 1997, the average Freiburg citizen produced 10.6 tons of CO<sub>2</sub> annually, by 2003, the amount had been reduced to 9.6 tons - three quarters of which comes from the energy sector.<sup>18</sup> Looking at the focus areas of Freiburg's efforts:

- Energy sector CO<sub>2</sub> emissions have been reduced from 1,660,000 tons CO<sub>2</sub> in 1993 to 1,574,000 in 2003 – a 5.2% decrease
- Transport sector CO<sub>2</sub> emissions have been reduced from 413,000 tons CO<sub>2</sub> in 1993 to 393,000 in 2003 – a 4.8% decrease
- Combined energy and transport sector CO<sub>2</sub> emissions have been reduced from 2,073,000 tons CO<sub>2</sub> in 1993 to 1,967,000 in 2003 – a 5% decrease.

### **Presentation of existing estimates concerning ancillary (effects) benefits**

At a time when solar manufacturers in general were withdrawing from Germany, Solar-Fabrik, a solar module production plant, chose to locate in Freiburg in 1997, employing 130 people.<sup>19</sup> Freiburg has also attracted those interested in an environmentally-sustainable lifestyle and who have felt empowered to evolve their communities and living space in a way they want to<sup>20</sup>.

<sup>15</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.

<sup>16</sup> <http://vorort.bund.net/suedlicher-oberrhein/freiburg-environment-ecology.html>

<sup>17</sup> [http://www.solarregion.freiburg.de/solarregion/freiburg\\_solar\\_city.php](http://www.solarregion.freiburg.de/solarregion/freiburg_solar_city.php)

<sup>18</sup> [http://www.c40cities.org/bestpractices/transport/freiburg\\_ecocity.jsp](http://www.c40cities.org/bestpractices/transport/freiburg_ecocity.jsp)

<sup>19</sup> <http://madisonfreiburg.org/sustainablecity.htm>

<sup>20</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.



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Freiburg is attracting solar research and development organizations. Fraunhofer Institute for Solar Energy Systems (ISE) is one of Europe's leading solar energy research laboratories<sup>21</sup>. ISES (the International Solar Energy Society) moved to Freiburg from Australia.<sup>22</sup> Additionally numerous other solar institutions have located their headquarters in Freiburg, and the city has often hosted major European solar energy conferences.<sup>23</sup> Also a large number of different ecological institutions have developed from the beginnings of the environmental movement: the Öko-Institute's Office as well as the European Office of the ICLEI [Local Governments for Sustainability] can be found in Freiburg.<sup>24</sup>

This strong practical and scientific knowledge has also made commercial partnerships in the field very attractive, and some innovative and inventive schemes further increase take up of renewable energy. One such partnership is that between Freiburg and Badenova, the main utility that operates the grid in the Freiburg region. The utility company cooperates closely with the municipality, where local policy and planning takes place.<sup>25</sup>

One of Freiburg's environmental policies' main benefits has been employment. In the case of Freiburg, they have contributed to keeping jobs which would have been otherwise lost (such as in construction). The economic structure of the Freiburg Region is dominated by the service and environmental industries. Excluding the manufacturing sector<sup>26</sup>, the number of people working in the Region's environmental industry is ca 25% above the national average<sup>27</sup>. This is also largely due to the fact that Freiburg has several large facilities. Freiburg does not have any manufacturing industry. Thus, there are no companies, for example, producing solar filters. Environment-related employment has been especially significant in the construction business and in education and training (including universities). Environmental policies also fit with Freiburg's position in a major tourist area. They have been used as a marketing argument, "Green City".<sup>28</sup> Money spent on solar and other renewable energy technologies, are also remaining within local circulation, instead of purchasing gas, oil or uranium elsewhere<sup>29</sup>.

### **Preliminary assessment of feasibility and any required modifications for similar policy measures in Finland**

Freiburg is regularly inundated with 'green' visitors and professionals, who are curious to learn how and whether the mix of factors prevalent in Freiburg could be adopted within their own cities and countries<sup>30</sup>. Finnish cities of similar size (such as Turku or Tampere) but also smaller ones could

<sup>21</sup> [http://www.young-germany.de/671.html?&cHash=cef2a2e378&tx\\_ttnews%5Btt\\_news%5D=826](http://www.young-germany.de/671.html?&cHash=cef2a2e378&tx_ttnews%5Btt_news%5D=826)

<sup>22</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.

<sup>23</sup> <http://madisonfreiburg.org/sustainablecity.htm>

<sup>24</sup> <http://vorort.bund.net/suedlicher-oberrhein/freiburg-environment-ecology.html>

<sup>25</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.

<sup>26</sup> Overall, the German environmental industry is strongly dominated by the manufacturing sector.

<sup>27</sup> [http://www.solarregion.freiburg.de/downloads/potentialstudie\\_english.pdf](http://www.solarregion.freiburg.de/downloads/potentialstudie_english.pdf)

<sup>28</sup> Thomas Dresel, Stadt Freiburg 3.6.2008

<sup>29</sup> [http://www.solarregion.freiburg.de/solarregion/freiburg\\_solar\\_city.php](http://www.solarregion.freiburg.de/solarregion/freiburg_solar_city.php)

<sup>30</sup> Hopwood, D. (2007). "Blueprint for sustainability? What lessons can we learn from Freiburg's inclusive approach to sustainable development?" ReFocus, May/June 2007.



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certainly benefit from the experiences gained by Freiburg – how to turn environmental pressures and climate challenges into a competitive edge that strengthens the city’s economic wellbeing and attractiveness.

Freiburg’s success in nurturing such a sustainable vision and variety of projects has arisen out of a unique set of circumstances that would be impossible to directly replicate in their entirety. But important lessons can be learned and experiences used to further the uptake of renewable energy development within smaller communities. One important step is to encourage both developers and occupiers to change the way new buildings are designed and constructed, and make lifestyle choices that will encourage sustainable living and communities. Energy performance should also be improved in, for example, existing 1960s buildings.<sup>31</sup>

While the challenges in Finland are quite similar, the policy measures for climate mitigation as well as for adaptation should be specifically tailored for each city, making use of its own strengths and networks – and supported by clear national objectives and policies. E.g. as an economic development driver, Freiburg's solar strategy has not required any specific structure, or core funding. It has been powered by the synergy created by the city's vision among many solar players working together, who gain a mutual benefit from each other's presence. In the open market, however, solar PV is still too costly for most builders and developers.<sup>32</sup> In this case the final success has been guaranteed by the German Law on Renewable Energy, providing the national framework and additional financial incentives required for success.

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<sup>31</sup> Hopwood, D. (2007). “Blueprint for sustainability? What lessons can we learn from Freiburg’s inclusive approach to sustainable development?” ReFocus, May/June 2007.

<sup>32</sup> [http://www.c40cities.org/bestpractices/transport/freiburg\\_ecocity.jsp](http://www.c40cities.org/bestpractices/transport/freiburg_ecocity.jsp)