

# **The Environmental and Solar Sector in the Freiburg Region**

- Short Version -

Study commissioned by the  
**City of Freiburg im Breisgau**

in co-operation with  
**Freiburg Wirtschaft und Touristik GmbH**  
**Freiburg Economic Region (Wirtschaftsregion)**

supported by  
**BASE Basel Agency for Sustainable Energy**

presented by

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## Motivation and Objectives

The environmental and solar sector plays a special role in the Freiburg Region, which covers the City of Freiburg and the rural districts of Breisgau-Hochschwarzwald and Emmendingen:

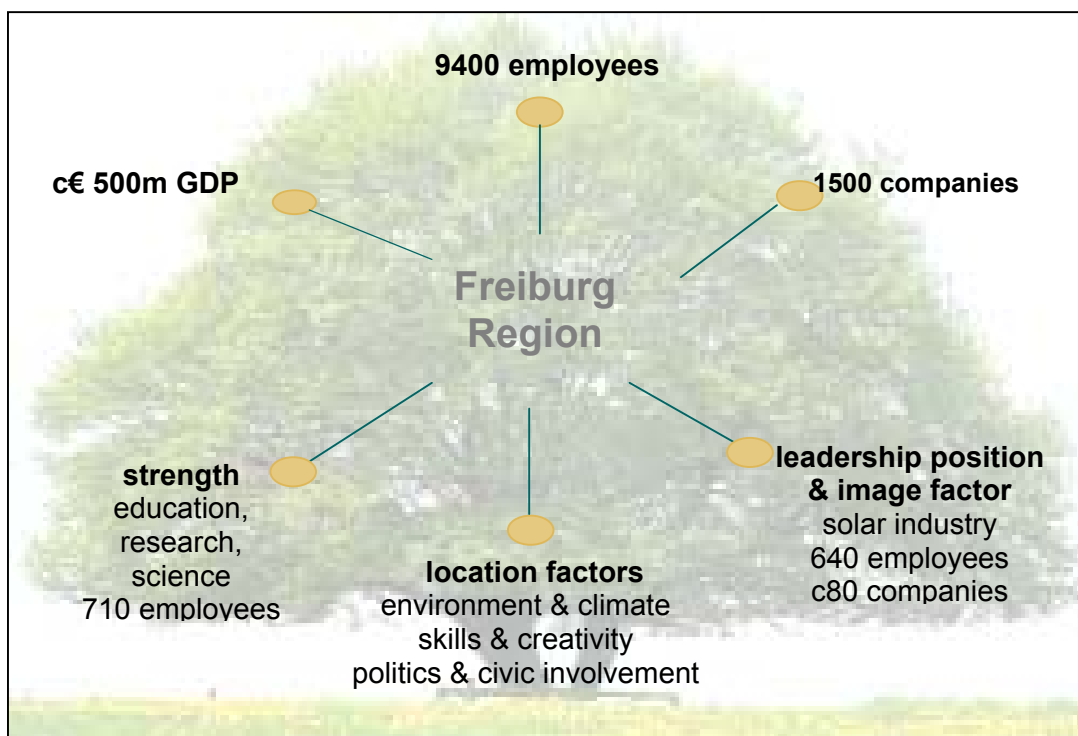
- Seen from an outside perspective, the environmental and solar sector is a very positive factor for the Region's image.
- Given that this sector makes highly efficient use of resources, it plays a key role in the development of a sustainable regional economic structure.
- Regional economic policy gives strong priority to this sector as a growth industry.

With the objective of gaining an insight into the current economic potential of the environmental and solar sector in the Freiburg Region, the present study was commissioned from the **BNL** consultancy Dr. Nikolai Lutzky by the Environmental Protection Agency (Umweltschutzamt) of the City of Freiburg im Breisgau in co-operation with Freiburg Wirtschaft und Touristik GmbH and Freiburg Economic Region (Wirtschaftsregion Freiburg), supported by BASE Basel Agency for Sustainable Energy.

## Main Results

### 1. Analysis

Fig. 1: The environmental sector in the Freiburg Region



## **Competence and Application Centre for the Solar Sector**

The Freiburg Region<sup>1</sup> has been able to significantly strengthen its position in some key and particularly promising areas of the environmental sector. For the solar industry in particular, the Freiburg Region is now Germany's leading competence and application centre. Local research institutes such as the Fraunhofer Institute for Solar Energy Systems (ISE), companies such as Solar-Fabrik AG and Solarstrom AG, Europe's largest solar fair, Intersolar, as well as institutions such as the International Solar Energy Society (ISES) have been able to broaden their roles over the last few years, forming a creative, innovative and competent economic region beyond the solar sector itself. Approximately 640 employees in almost 80 companies already work in the solar industry in the Region, more than half for the FhG ISE.

Freiburg's number one position in the utilization of solar energy for the generation of heat and electricity has been given official validation by the Region's first place in the solar league table (Solarbundesliga). The large number of solar power stations, communal building projects involving solar energy and the increasing collector surface on Freiburg's roofs and walls reflect the Region's leading role. The solar residential area (Solarsiedlung) "am Schlierberg" and the Solar Info Center both serve to further strengthen the Region's solar image.

## **Environmental Service Industry**

Approximately 9,400 people work in the environmental "cross-sector" in the Freiburg Region, which constitutes 3% of all employees (see table 1). Around 1,500 of the Region's companies participate in adding value to the environmental sector, which is worth c€ 500m per year.

The economic structure of the Freiburg Region is dominated by the service and environmental industries. Excluding the manufacturing sector, the number of people working in the Region's environmental industry is approximately 25% above the national average. Given that the national German environmental industry is strongly dominated by the manufacturing sector, however, the level of environment-related employment is slightly below the national average in the Freiburg Region, which is a region with little manufacturing industry.

## **Determining Factors**

The deviations in environment-related employment rates in the Freiburg Region within individual industry sectors are a result of the following structural factors:

- **Ecological factors and settlement patterns:** The above-average ecological assets and the Region's largely rural settlement pattern lead to a low demand for regulating environmental protection and clean-up; this is reflected in the below-average employment figures in certain industries, particularly in the manufacturing sector, areas of company-oriented services and the waste-disposal industry. The demand for public transport (environmentally-friendly transport services) is generally lower in rural areas than it is in urban areas. However, ecological resources create additional jobs in agriculture, forestry, gastronomy and tourism.

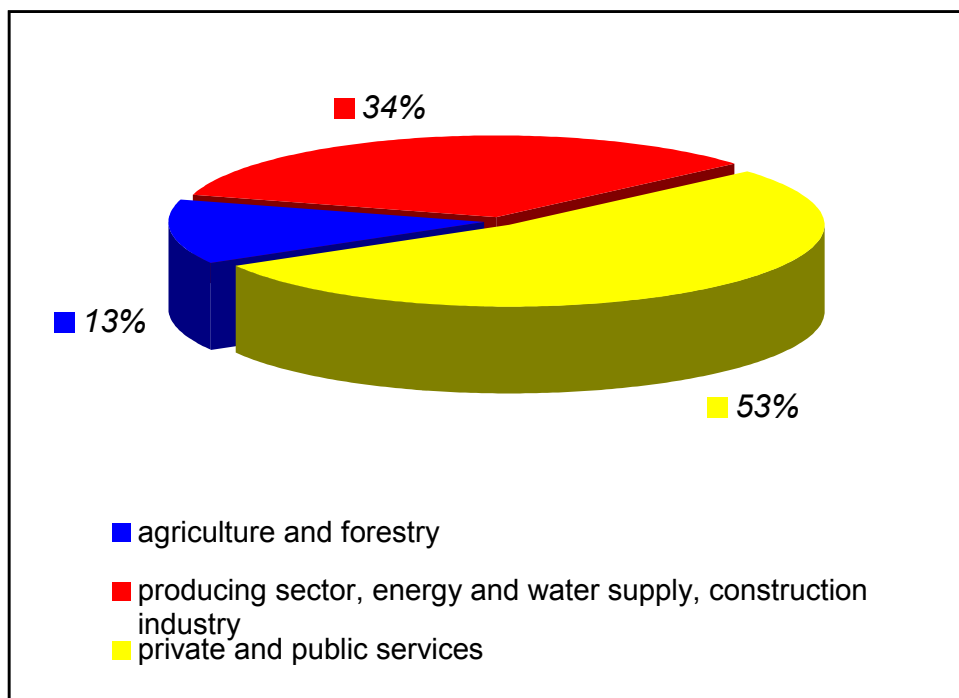
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<sup>1</sup> The Freiburg region includes the City of Freiburg and the rural districts Breisgau-Hochschwarzwald and Emmendingen, with a total number of c597 000 inhabitants (year 2000).

- **Imports:** The demand for products from the manufacturing sector and energy supplies in the Freiburg Region is primarily met by imports from other regions. The added value and jobs connected with the production of such products are therefore created elsewhere.
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- **Central supply function:** In the Freiburg Region, an above-average number of employees work in the construction industry and in trade, which leads to an increased number of employees working in environment-related jobs in these sectors.
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- **Ecological and environmental technical competence centre:** The unusually high number of employees working in environmental education, research and science is a result of the specializations which have taken place at the University and other institutions.

On the whole, environment-related jobs in the Freiburg Region belong to the following sectors:

**Fig. 2: Environment-related employment in the Freiburg Region by sector**



**Table 1: Employees in the environmental sector: National and Freiburg Region 2000**

	Sector	Employees national (ifo)	Freiburg Benchmark Region	Employees Freiburg Region	Method
	1	2	3	4	5
1	Agriculture and forestry	55 700	423	1 202	A, C
2	Manufacturing sector	514 000	3 906	2 182	B
3	Energy and water supply	41 900	318	150	A, B, D
4	Construction industry	68 000	517	885	B
5	Environmental services for companies	168 800	1 286	970	A, B, E
6	Environment-oriented services in the trade sector	86 000	654	1 334	B, E
7	Environmental services in gastronomy and tourism	5 000	38	149	B
8	Environmentally acceptable transport services	75 500	574	380	A, D, E
9	Environmental administrative services	59 800	454	543	C
10	Environmental education, research	22 500	171	710	D, E
11	Waste-disposal sector	166 300	1 264	795	A
12	Lobby groups, NGO services	13 000	100	100	E
	<b>Total</b>	<b>1 277 000</b>	<b>9 705</b>	<b>9 400</b>	
	Total excl. manufacturing sector	763 000	5 799	7 218	

**Notes:** Column 2: Employees in the environmental sector in Germany in 2000 according to ifo  
Column 3: Benchmark Freiburg Region = national value x 0.76 (share of Freiburg Region in national employees)  
Column 5: Calculation methods A – E – see explanations below  
Row 2: excluding energy and water supply, excluding mining industry

**A: Basis for data:** Statistics of employees subject to social insurance according to sectors within the district served by the Freiburg Employment Office on 30<sup>th</sup> September 2000; source: Freiburg Employment Office (Arbeitsamt)  
**Calculation of employees in environment-related jobs** based on Ifo study

**B: Basis for data:** Statistics of employees subject to social insurance according to sectors within the district served by the Freiburg Employment Office on 30<sup>th</sup> September 2000; source: Freiburg Job Employment Office (Arbeitsamt)  
**Calculation of employees in environment-related jobs** based on the results of the study by the Halle Institute of Economic Research. The basis of that study was the open forum set up by the Institute of Employment Research from 1999, which looked at the percentage of sales generated by environmental goods and services in 1998.

**C: Basis for data:** Statistics on the number of persons employed in the federal state of Baden-Württemberg, checks through expert consultation.

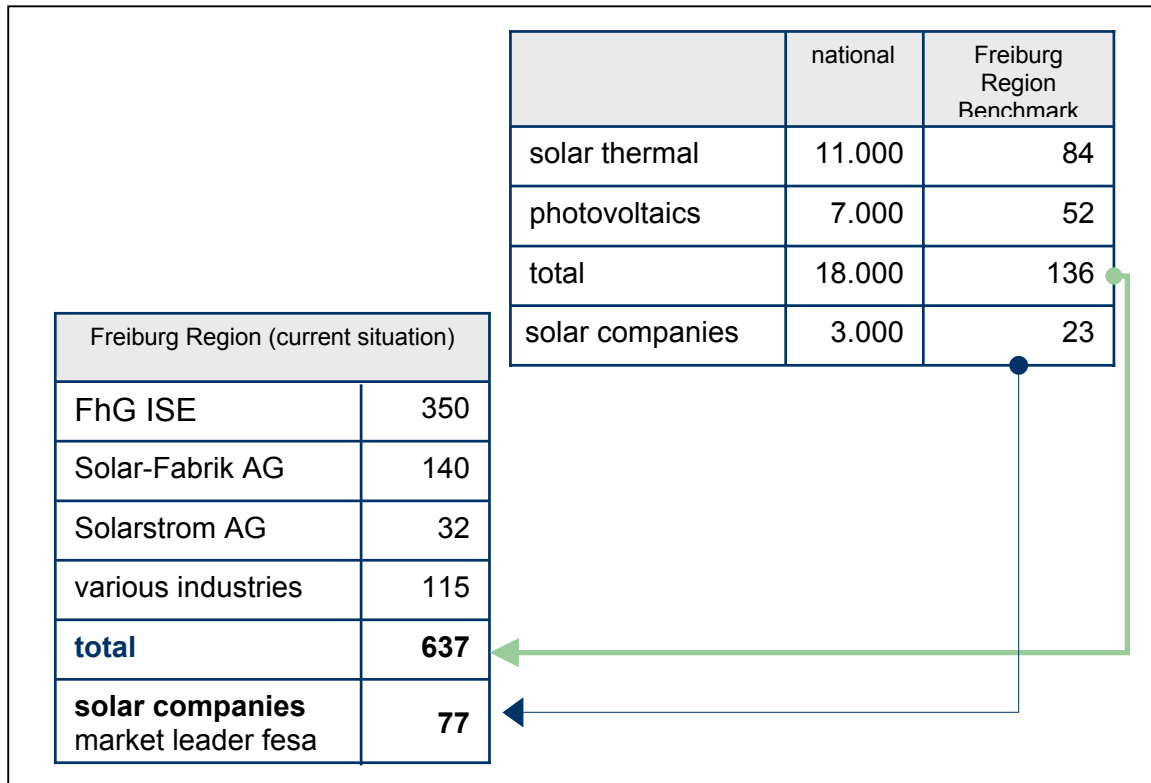
**D:** Collection/checking of data through expert consultation

**E:** Own research (directories, data from associations and chambers of trade and commerce, telephone research)

### Special Consideration of the Solar Sector

In the more specific sector of solar energy generation, subdivided into solar thermal technology and photovoltaics, the analysis of the Freiburg Region reveals employment and company figures which lie 4-5 times below the national average.

**Fig. 3: Employees in the solar sector**



In addition to the strong local concentration of solar skills, products and services, Freiburg’s reputation as the “solar capital” is a result of the use of solar energy having been introduced very early on and now being very advanced. The combination of these aspects leads to the special “Freiburg Mix”<sup>2</sup>, a combination of the factors climate/research/production/market/politics/civic involvement, which has led to the creation of a unique situation in Germany.

## 2. Evaluations

### Profile of the environmental sector: key sectors, strengths and potential

The key sectors within the regional environmental sector are shown in table 2 together with their particular strengths and potential. The regional environmental sector’s core elements are:

- science, innovation and education
- environmentally-oriented services
- application of ecological skills
- supply and demand of renewable resources

<sup>2</sup> Zitat Georg Salvamoser

**Table 2: Profile of the environmental sector in the Freiburg Region**

Key sector	Strengths	Examples
Agriculture and forestry	Utilization of biomass reproductive raw materials organic farming, organic wine-growing	Pellet production by Dold, Buchenbach
Manufacturing sector	Measuring and control technology energy and solar technology	Sick Wehrle, Volk, Solar-Fabrik, Energossa
Energy and water supply	Supply and utilization of renewable energies, especially water, biomass, solar, heat contracting, natural gas-powered vehicles, 38 projects of the Innovation Fund for Climate and Water Protection Competence centre badenova	Badenova-Regiostrom, Solarstrom AG, Solar power stations at the trade fair centre, the university clinic, Ganter, SWR, SC-Stadium, Vauban, 3 wood chip installations, regiowind : 6 wind turbines Rhodia co-generation power plant, Hydroelectric power station Volk AG, Schluchsee-Werk (administration)
Construction industry	Ecological construction solar construction Construction and renovation sector	Low-energy residential areas Vauban and Rieselfeld, Solartower, plus-energy houses, buildings restoration, etc.
Environmental services for companies	Ecological and solar architecture, analyses Know-how in energy technology	Architectural and engineering firms, technical energy services, energy agency, Solar Info Center Intersolar trade fair
Trade	“Reform” trade (270 employees) Ecological mail order	“Waschbär“ (c100 employees)
Gastronomy, Tourism	Environmental tourism, solar tourism, experience of nature, regional products	Freiburg Futour, Hotel Victoria, environmental seminars for visitors from Japan
Environmentally acceptable transport services	Public transport offer and utilization Cycling “culture”	Regional public transport association, Regio-Karte (monthly ticket covering public transport in the region), Cycle station „mobile“
Education, research, science	University: forestry, biology, environmental medicine, geology, environmental law  R&E: Solar technology, energy efficiency  Agriculture, reproductive raw materials, wine growing Environmental policy	27 university departments with environmental element, Institute for Environmental Medicine,  5 FhG institutes, FhG-ISE  Institute for Environmentally Compatible Agriculture (Institut für umweltgerechte Landwirtschaft) Müllheim Wine-growing Institute (Weinbau-Institut) Öko-Institut
Lobby groups, NGOs	Interregional, international institutions	ICLEI, fesa, BASE, ises, environmental centre (Umweltzentrum), IHK, energy agency (Energieagentur)

## **Strengths and Potential of the City and the Rural Districts**

Within the Region, the **City of Freiburg** has particular strengths and potential in the areas of

- research and development,
- supply and utilization of renewable energies,
- solar architecture and solar construction,
- company services in the areas of analytics and energy technology,
- training, research and education,
- activities of environmental organizations and lobby groups.

The particular strengths and potential of the two **rural districts** are:

- processing and utilization of biomass, particularly wood,
- ecological agriculture with a focus on ecological wine-growing, as well as the future-oriented field of generating reproductive raw materials for use as fuel or industrial applications,
- in the rural district of Emmendingen, the manufacturing sector with the production of energy installations and measuring and control technology,
- in the rural district of Breisgau-Hochschwarzwald various projects in the field of nature conservation, and environmentally-viable agriculture, which have a positive impact on training opportunities, structural change in agriculture and forestry, and tourism.

### **Location factors:**

#### **Nature & climate / skills & creativity / politics & civic involvement**

The exclusive position and special profile of the regional environmental sector are the result of 3 situation-related factors which are specific to this region:

- **Politics and civic involvement:** The great importance which the Region's citizens place on environmental issues and their ecological involvement are the driving force for the increasing utilization of renewable energies and environmentally-friendly products and services.
- **Nature and climate:** The natural environment – particularly in the two rural districts – has given tourism and agriculture a special economic importance: The utilization of biomass, organic farming/healthy eating and the generation of reproductive raw materials have been particularly developed; the favourable climatic conditions have been and remain the driver of the solar sector;
- **Science and creativity:** Science is dominated by the Region's outstanding role as a creative environmental research and innovation centre;

### **Development Area Training**

Interregional- training requirements are largely met by the University, particularly in the areas of forestry, biology, hydrology, environmental medicine and fire ecology. Training also takes place within various research projects, nature conservation projects, the projects of the Innovation Fund for Climate and Water Protection of Badenova, in independent projects, school projects and development projects by companies. As far as the integration of solar technology and other renewable energies in initial professional training programmes is concerned, the Region plays a pioneering role within Germany (examples: the solar tower at the Richard-Fehrenbach trade school, Freiburg trade academy with cross-company training courses for renewable energy technologies).

### **Research and Development**

The number of employees in the areas of environmental training, research and science in the Freiburg Region is approximately 710, which is four times the national average. The Fraunhofer Institutes (particularly the FhG ISE) and also private research institutes and consultancies play an important role by disseminating basic research into the market place.

**Given the impetus it gives to large areas of the regional economy, and its image-creating role, research and development could be described as the engine for the development of the regional environmental sector into a structural growth cluster.**

### **Cross-Border Issues**

The neighbouring regions of Alsace (France) and North Western Switzerland are also pioneering regions in the environmental sector within their respective countries. Cross-border cooperation has led to the following areas of intensified cooperation between these three regions in the Upper Rhine area:

- Training, further training and research
- development, transfer and marketing of skills, technology and experience
- location planning for renewable energy facilities
- cross-border development by expanding the value-added chains or by close contacts with suppliers from across the border; inclusion of SMEs in particular
- cooperation between companies, e.g. between utility companies
- environmental tourism
- financing and risk assessment
- export
- market research, marketing and opening of new markets
- access to EU funds.

### 3. Fields of Activities for the Region and its Local Authorities

#### Consolidating strengths – seizing opportunities

The consistent consolidation of existing strengths should mainly be directed at seizing the opportunities of developing the Freiburg environmental and solar region (see fig.4):

**Fig. 4: Environmental sector in the Freiburg Region: Strengths – weaknesses / opportunities - risks**



- **Growth markets:** According to a forecast published by the EU Commission, the global market for environmental technologies and services will grow from €300 billion in 2000 to €740 billion in 2010. Consequently, global environmental markets will offer long-term export opportunities to the environmental and solar sector.
- The **Freiburg Region**, and its two rural districts in particular, continues to provide considerable market opportunities, for instance in the renewable energy sector and organic farming.
- In addition, the mutual **cross-border serving of markets** within the Upper Rhine Region is still in its infancy.

- the **expansion of regional innovation and value-added chains** can create additional jobs and regional income through attracting companies, strategic partnerships, spin offs and start-ups, etc..
- these opportunities can be translated into economic success if existing **competence advantages** in the key sectors of regional environmental economy can be secured and expanded.
- Additional opportunities for trans-regional profiling lie in the intensification of **communication activities** using the support of regional partners from the communication and media sectors.

### **Fields of activity: the environmental sector as a regional growth cluster**

Against this background, we recommend an orientation on the regional economic cluster model for the further development of the regional environmental and solar sector. “**Clusters** are subject-oriented networks of players with the objective of promoting economic growth. Successful clusters generally cover the entire value-added chain, from basic research to marketing finished products and services.”<sup>3</sup>

Promising fields of activities for the development of the regional environmental and solar sector into a regional economic cluster with strong innovative power and growth drive, are:

1. Continued activation of the public and the private market
2. Strengthening of regional innovation networks
3. Cross-regional impact

### **Recommendations for Key Projects**

Playing the role of pace-setter for the solar sector and expanding the core of the environmental and solar growth cluster is the joint key task of regional environmental and economic policy. To implement such a strategy we suggest launching key projects appropriate for generating the required impetus and thrust for the further development of the regional environmental and solar sectors.

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<sup>3</sup> Landesstiftung Baden-Württemberg (publisher): Future investments in Baden-Württemberg (Zukunftsinvestitionen in Baden-Württemberg)