

European Employment Observatory

**EEO Review: The Employment Dimension of Economy
Greening**

Germany

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Abbreviations

BIBB	Federal Institute for Vocational Education and Training (<i>Bundesinstitut für Berufsbildung</i>)
BMBF	Federal Ministry of Education and Research (<i>Bundesministerium für Bildung und Forschung</i>)
BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (<i>Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit</i>)
CHP	Combined heat and power (Kraft-Wärme-Kopplung)
DBFZ	German Research Centre for Biomass (Deutsches Zentrum für Biomasse Forschung)
DIHK	Association of German Chambers of Industry and Commerce (Deutsche Industrie- und Handelskammer)
DIW	German Institute for Economic Research (Deutsches Institut für Wirtschaftsforschung)
DGB	German Federation of Trade Unions (Deutscher Gewerkschaftsbund)
EEG	Renewable Energy Law (Erneuerbare Energien Gesetz)
EEWärmeG	Renewable Energy Heat Law (Erneuerbare Energien Wärmegegesetz)
IEKP	Integrated Energy and Climate Programme (Integriertes Energie- und Klimaprogramm)
KfW	Reconstruction Loan Cooperation
MAP	Market Incentive Programme (Marktanreizprogramm)

1. Introduction¹

Climate change and environmental protection has been an important element in German policy debates for decades. The awareness of climate protection has not only been a matter of public concern. It has also changed the political spectrum and has strongly influenced political decisions.

Environmental policies have been significantly affected by the emergence of the Green Party in 1980. Originating from grassroots level this party has promoted the ideas of ecological sustainability, environmental protection and the end of nuclear energy production. The movement became part of the government over the period 1998-2005, during which it ensured the implementation of various laws on environment and climate protection. In the last parliamentary elections in September 2009 the Green Party received 10.7 % of votes – the highest results since it first formed.

From the start of the public debate, environmental policies have focused on both, improved living conditions and opening market opportunities on ecological markets. Thus, policy making has successfully combined environmental protection with economic growth and job creation. In recent years the sector for environmental technologies and renewable energy has emerged as a growth market and has substantially stimulated German exports and employment.

The grand coalition between the Social Democrats and the Christian Democrats, which was in force during 2005-2009, did not significantly change the principles of environmental policies and the recently elected conservative-liberal Government has reinforced these policies, with the exception of nuclear energy.

2. Environmental policies and labour market outcomes

2.1. Economic and legal background

General policy response

In 2007, over and above the European goals for 2020, the German Federal Government agreed on the Integrated Energy and Climate Programme (IEKP), which defines the German targets for 2020. In particular, the goals are:

- A 40% reduction in greenhouse emissions compared to 1990.
- A 3% rise in energy efficiency per annum – twice as high as compared with 1990.
- Higher contribution of renewable energy. 18% of energy generation by 2020; 30% of electricity generation, 14 % of heat generation and a 7 % proportion of bio-fuels.
- 25% share for combined heat and power generation.

¹ This report is partly based on the CEDEFOP Study „Skills for green jobs in Germany“ undertaken by Economix in 2009 and 2010 (Economix forthcoming).

The implementation of the goals resulted in a wide range of laws and regulations. The most important measures in the relevant policy fields are summarised in Table 1.

Table 1: Elements of a green economic policy

<i>Renewable energy</i>	The extension of renewable energies is mostly supported by the Renewable Energy Law (EEG), the Renewable Heat Law (EEWärmeG) and the Market Incentive Programme (MAP). The laws and programme foster investments in renewable energies, repowering of older offshore wind stations and improved access to the network grid. Heat in new buildings has to be partly covered by renewable energies and the use of renewable energy is financially promoted. The focus is on investments in buildings which contribute to a higher use of renewable energy for their heat supply.
<i>Biogas and biofuels</i>	The access of biofuel to the natural gas network was simplified. Due to the Biofuel Rate Law, the minimum rate of biofuel in petrol and diesel has to sum up to 6.25 %. Moreover, due to the National Biomass Action Plan, the contribution of bio energy for energy supply is fostered.
<i>Energy efficiency</i>	Reconstruction of building in an environmentally sound way is promoted. The construction of combined heat and power stations (CHP) and heat grids is also supported (Law of Combined Heat and Power). Moreover, mini CHPs for households are promoted. The Federal Government also supports the German Energy Agency which communicates promotion programmes and the EnergyEfficiency Initiative.
<i>Emission trade</i>	Since 2005, companies need emission certificates for the amount of their allowed greenhouse emissions. In the beginning, the certificates were distributed for free, but in 2013 all certificates for electricity generation and parts of the certificates for the industrial area will be auctioned.
<i>Sustainable mobility</i>	In order to lower greenhouse emissions which emerge in the transport sector, regulations for carbon limits regarding carbon monoxide, nitrogen oxide, hydrocarbon and soot particle were implemented and continuously tightened. The last two regulations - Euro 5 and 6 - are valid in 2009 and 2014, respectively. The car tax was revised as carbon dioxide oriented in 2009. Car labelling and environmental zones in German cities increase the demand for cars with low carbon emissions. The development of battery powered cars is fostered by the National Development Plan for Electric Mobility.

Source: Economix

In 2005, expenditure allocated to environmental protection stood at around EUR 34 billion, which is 1.5 % of GDP. This included investments and current expenses for environmental protection by the Federal and Länder States, the manufacturing industry (excluding the construction sector) and privatised public companies. The

expenditures were spent on waste disposal, water pollution control, noise abatement and air pollution control.²

Environment-related taxes

As early as the 1990s different environment-related taxes were implemented, focussing on physical units with a negative impact on the environment. In other words, emissions like air emissions, sewage, or noise, fertiliser and pesticides. The measures were particularly targeted at energy production and traffic by means of an energy tax (previously known as mineral oil tax), an electricity tax and the motor vehicle tax. The so-called “eco tax”, which was implemented in April 1999, comprised the gradual rise in the energy tax between 1999 and 2003 and the introduction of the electricity tax. Motor vehicle tax has been transformed into an emission related tax during the last years (see below).

In 2008, environment-related taxes amounted to EUR 54.4 billion; of which, EUR 39.3 billion came from energy tax, EUR 8.8 billion from motor vehicle tax and EUR 6.3 billion from electricity tax.³ Tax deductions and tax exemptions have been included in the calculation. Tax deductions are directed at the agricultural sector, parts of the manufacturing industry, rail traffic and local passenger traffic. Combined heat and power stations and electricity from renewable energy sources are tax-exempt.

Green recovery measures

The Federal Government introduced two economic stimulus packages during the end of 2008 and beginning of 2009. According to the study by HSBC, in 2009 the proportion of the German stimuli packages on green investments amounted to around 13 % of the total EUR 100 billion allocated.⁴

Both economic stimuli packages focus on the promotion of low carbon cars. In July 2009, the car tax was revised as a carbon dioxide oriented tax. Furthermore, a tax exemption for new cars was introduced for one year and if the cars meet the Euro 5 or Euro 6 standards the exemption can be extended for another year. In addition, a further EUR 5 billion was allocated for the car scrappage scheme. A purchaser of a new car received EUR 2 500 they deregistered a vehicle that was older than nine years. Another EUR 500 million were invested in fostering application-oriented research in the field of mobility (e.g. hybrid motors).

According to the first package, during 2009-2011 EUR 3 billion will be used to improve the energy efficiency of buildings and for reconstruction. The tax deduction for craft services for maintaining and modernising buildings was raised. A stimulus of EUR 300 million is being used by the Reconstruction Loan Cooperation (KfW) to supply credits with low interest rates for investments in energy efficient technologies. The second package of EUR 6.5 billion will promote research related to energy efficiency and the reconstruction of schools and universities.

² Statistisches Bundesamt 2009, *Statistisches Jahrbuch 2009*.

³ Statistisches Bundesamt 2009, *Umweltnutzung und Wirtschaft*.

⁴ HSBC 2009 *A Climate for Recovery – The colour of stimulus goes green*.

Growth markets - environmental technologies

The sector for environmental technologies has developed as global market and is expected to show high growth rates of around 6.5 % per annum (BMU 2009). According to these estimates, sales of environmental technology will exceed those of car manufacturing or mechanical engineering by 2020. German companies hold high market shares, between 6 % and 30 % worldwide, and will therefore be in a good position to profit from worldwide investment growth (Table 2).

Table 2: German market shares in environmental technologies, 2006

Environmental sector/market	German market share	Expected global growth (2008-2010)
Sustainable power generation/storage:	30%	29%
Energy efficiency:	20%	20%
Materials efficiency:	6%	21%
Waste management (& recycling):	24%	18%
Sustainable water management:	10%	15%
Sustainable mobility:	18%	15%

Source: BMU 2009 *GreenTech 2.0*

Most of the German regions are able to participate in the overall positive development of business operations in environmental technologies. However, the profiles of the regions in terms of specialisation differ: in the West, energy efficiency is part of the leading markets, whereas in the East, sustainable energy and storage dominate. The companies with higher sales are located in the western Germany but the market structure is gradually converging. Environmental technologies have therefore been established as a job motor, which is particularly important in eastern Germany.

2.2. Labour market effects

Employment in environmental activities

In addition to the people working in the environmental technologies sectors, the number of workers in environmental protection includes those who are operating facilities, supervising standards, and researching and analysing ecological issues etc. The scope of environment related activities has expanded substantially over the years and has changed many activities rather than creating specialised environmental occupations. As a result, estimates of the number of environmental jobs have to calculate the employment effects on the basis expenditures with the help of input-output models.

According to a study by the DIW, 1.8 million people were working in the environmental sector in 2006.⁵ This means 4.5 % of the labour force. The number of employees increased by 290 000 compared to 2004, which is a rise of almost 20 % within two years. An overview of the distribution of employees is presented in Table 3.

⁵ DIW 2009 *Beschäftigungswirkungen des Umweltschutzes in Deutschland*.

Table 3: Employment in the environmental sector (Germany), 2006

Employment effects of environmental expenditures on	Employees	% change
	2006	2006/2004
investments	175 000	14,4%
material costs	175 000	-4,4%
services and staff	1 132 400	19,9%
renewable energy	235 600	46,7%
foreign demand for environmental protection goods	49 000	40,0%
Sum	1 767 000	19.7%

Source: DIW 2009

The renewable energy sector has one of the highest growth rates with almost 47 %. The rise in employment in the biomass sector by 67% played an important part in this progress. In total, 95 400 people work in this sector, the largest field within the renewable energy sector. However, other sectors have also developed positively: solar thermal (40 200 workers, + 60 %), wind power (82 100, + 29 %) and geothermal (4 200, + 130 %). Only water power decreased by 1 % and this was due to increased labour productivity.

The methodology and data for estimates have improved in recent years. Nevertheless, new areas as ecotourism, environmental-related insurance industry and product-integrated environmental protection could not be integrated into the estimates due to a lack of suitable data. As a result, the 1.8 million employees identified may underestimate the actual number of green jobs.

Future green jobs

Over the coming decades the number of people working in environmental protection is forecasted to rise. According to a 2008 study by the BMU, the IEKP policy measures will lead to a 35 % decrease in greenhouse emissions by 2020, compared with the 1990 levels. This can be achieved by an average investment of EUR 30 billion per year in renewable energy, insulation and more efficient home appliances and cars. The investments will support employment growth and will lead to the creation of an additional 500 000 jobs in environmental protection by 2020 and 800 000 jobs by 2030.⁶ Other studies also estimated positive employment growth in renewable energy; a rise of between 400 000 and 500 000 employees by 2020 and to 710 000 employees by 2030 is expected.⁷

Estimates by Roland Berger Consulting suggest an even more favourable job performance outlook: in addition to the 1.2 million people already working in the environmental technology sector in 2008, an increase of 1.1 million workers by 2020 is expected in this sector.⁸

⁶ BMU 2008 *Investitionen für ein klimagerechtes Deutschland*, Zwischenbericht

⁷ Wissenschaftsladen Bonn 2007.

The estimations for 2020 come from a study by the DIW (2007) and the Federal Association for Renewable Energy, whereas the estimation for 2030 from Roland Berger.

⁸ The number was estimated with a market model, which is based on company interviews. All in all 1,400 companies from the environmental technology sector were interviewed.

Skills shortages

In the environmental sectors the demand for skilled workers focuses on graduates of the so-called MINT subjects (mathematics, engineering, natural sciences), which have had low graduation rates in recent years. In 2006, there was already a shortfall of 165 000 highly qualified engineers and technicians.⁹ Companies assessed the availability of qualified staff as one of the most important success factors besides the demand for their products.¹⁰ According to the companies, skills shortages were limiting the growth of these sectors.

The largest problem was the availability of engineers. Graduation rates have been low in recent years and the prospects for the next years have not changed. Many experienced engineers will retire over the next few years, which will exacerbate the lack of engineers. The German “engineer replacement rate”, which defines the rate of newly graduated to retiring engineers, is low compared to other European countries, standing at only 0.9 – for each ten engineers that retire only nine entrants are available from universities.

Recruitment in the environmental technology sector has to compete with the automobile sector, which is the largest employer of engineers. The fact that companies in the environmental technology sector currently have low sales levels often makes them less attractive for potential engineers in terms of working conditions and career prospects; companies have difficulties in competing with companies like BMW or Siemens.

3. Review of labour market policy developments

The promotion of green jobs has been concentrated on initial and continuing vocational training, as well as on research in environmental technologies, renewable energy and energy efficiency. The instruments of labour market policies and ESF funds have hardly been used for this purpose.

3.1. Training policies

The high demand for skilled workers in environmental protection resulted in the promotion of education and training. Programmes have been initiated and dual vocational training and university studies have been adapted in order to meet the requirements.

In 2006, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety launched the educational initiative ‘Environment Creates Perspectives’ in association with companies in the fields of environmental technologies and renewable energy. The Federal Ministry of Education and Research (BMBF), the Federal Institute for Vocational Training (BIBB) and the Chamber of Commerce (DIHK) are also participating in the initiative. As a

⁹ IWD 2007 *Ingenieure deutsche Mangelware*, iwd Nr.20, 17.05.2007.

¹⁰ BMU 2009: GreenTech 2.0.

result of the initiative 6 000 additional apprenticeships were created in 2009. Moreover, the initiative supports the identification of apprenticeship trades, skills and competences needed in the environmental sector. An overview of other programmes is presented in Table 4.

Table 4: Policy initiated programmes

Programme	Initiator	Targets
Environment creates perspectives	BMU, BMBF, DIHK, BIBB	In 2009 6,000 additional apprenticeship training places were created in the fields of environmental technologies /renewable energy
Pilot project for CVT	BMU, DGB	Increase employees' and work councils' awareness for resource efficiency in operational and production processes
Information brochure, IVT - environmental technicians	BMU, DIHK	Improvement of occupations' image, higher amount of apprentices
CVT in forestry	BIBB	Promotion of young scientists and engineers in the field of bionics
DAAD - studying and researching for sustainability	BMBF	Promotion of education and research to create solutions and competences for a sustainable production of biogenetic resources.
Powerado and Powerado Plus	BMU	Promotion of new ways to communicate renewable energy within education
German Centre for Biomass Research	Fed. Government	Promotion of research in bio energy
Research in Lithium Ion Batteries	Fed. Government	Promotion of research in energy storage

Source *Economix*

Environmental protection has also been included in the education system in both dual vocational training and university education; however, levels of integration differ between integration in existing training courses and the development of new training. New initial trainings and university studies have been introduced and additional degrees with environmental specialisation have been added.

In 2002, four new trades were developed in dual vocational training, notably the:

- Recycling and Waste Management Technician (*Fachkraft für Kreislauf- und Abfallwirtschaft*);
- Water Supply Engineering Technician (*Fachkraft für Wasserversorgungstechnik*);
- Sewage Engineering Technician (*Fachkraft für Abwassertechnik*); and
- Pipe, Sewer and Industrial Service Technician (*Fachkraft für Rohr-, Kanal und Industrieservice*).

In 2008, 2 500 apprentices were employed in the newly introduced trades.

Table 5 : University students in environmental studies 2008

University studies	Number of students
Nature conservation in agricultural sciences	455
Waste management	132
Energy technique	3049
Environmental techniques (inclusive recycling)	7039
Environmental protection in urban planning	3432

Source: Statistisches Bundesamt 2009, *Fachserie 11, R 4.1, WS 2008/2009*.

At university level, study courses were established that focus on environmental protection (Table 5). It has to be taken into account, that these study courses do not include all students who have specialised in ecology as these issues have been integrated in various existing courses.

3.2. ESF Funding

The European Social Fund (ESF) supports active labour market programmes and aims to integrate people in the labour market. In Germany the priorities of its promotion are set on four axes: adaptability of employees and companies, strengthening of human capital, access to employment and trans-nationality.

None of the measures fostered focus on environmental protection or on the adaptation of employees' qualifications in the context of environment. Thus, environmental aspects only play a secondary role in the alignment of the promotion programmes. Moreover, there is no obligation to report on sustainability or environment under the monitoring process.

3.3. Practices

Training in renewable energy sector

In 2007, the training rate, which is the ratio between the apprentices and the employees of a company, stood at around 5% in the renewable energy sector; quite low compared to an average of 6.5 % in Germany. This means that the companies in the renewable energy sector recruited qualified workers rather than offering dual training courses.

On one hand this development might be explained by the fact that training takes too much time in the face of rapidly growing production. On the other hand, the education system still does not offer suitable initial training for renewable energy. Companies have to recruit qualified workers and train them further for their own needs. The integration of an initial training for renewable energies would help to foster the training activities of companies in this sector.

Research

Environmental technologies are knowledge-intensive and companies have high innovation rates. The proportion of research and development on sales was 5 % in 2004, which was higher than the average of manufacturing production.¹¹ Sectors, which have been particularly innovative, are:

- Manufacturer of facilities and external components;
- Suppliers from the market segments energy and environment;
- Process engineering;
- Air pollution control and water pollution control; and
- Suppliers from integrated technologies and environmental friendly products.

¹¹ BMU 2009, *Umweltwirtschaftsbericht 2009*

Between 2002 and 2006 the average world share of German patents was 16 % in photovoltaic, 32 % in solar thermal and 31 % in wind power.¹²

Thus, skills requirements are high and result in a high share of academics among the workforce; in 2001, a rate of 30 % was measured.

3.4. Assessment of existing labour market reforms

A skills response in order to promote education and training is visible. Promotion programmes have been established, technical qualification trainings are offered and new study courses and further training with environmentally relevant subjects have been developed. Beyond new types of training, many existing training courses are becoming greener due to the integration of environmental protection aspects. Continuous vocational training related to environmental protection is particularly substantial.

There is, however, still scope for improvement. Companies that work in environmental technologies or in renewable energy were already facing a shortage of skilled workers in recent years and this is likely to continue in the following years. Educational policy has not sufficiently increased capacity, as the high growth in demand was underestimated. As in previous cases of rapid transition, the education and training system was slow to avoid skills shortages.

4. Conclusions

Climate protection already plays a leading role in Germany, not only in terms of policy making but also in transforming economic activities. One worker out of 20 is employed in the environmental sector. Sales in this sector stimulate economic growth and future increase is expected. In many technologies German companies are world leaders and realise a high proportion of exports.

Nevertheless, public awareness of environmental issues and the goals set for environmental protection are still ambitious. While German policy has paved the way for further improvement of environmental protection and a reduction in greenhouse emissions, the further development and adaption of laws and regulations must be accelerated. Inefficient regulations have been revealed in particular in subsidised power from renewable energy sources. According to the current discussion, the subsidy for solar power, for example, leads to an 'over-stimulation', whereas the use of wind power would be more efficient. Therefore, the Federal Government plans to cut the subsidies and to invent a mechanism which reacts flexibly to market developments.

Until recently, Germany has been in a position to profit from the growth of the environmental technologies markets. This has largely compensated for the negative effects of higher energy costs and protective expenditures. However, Germany will be faced with stronger competition in these markets and will have

¹² Roland Berger 2009

to extend expenditures on environmental protection.

Only some sectors can be classified as advanced in terms of environmental protection, such as the chemical industry, recycling or waste disposal. The broad restructuring in response to environmental challenges is still very slow in other areas. For example, the automobile sector has been slow in taking up environmentally friendly technologies and is far away from the mass production of hybrid or electric cars. The energy generation which is still dependent on nuclear power and coal also needs to undergo structural change. In the past the German Government has not promoted investments in the greening the economy enough and, as a result, is now having to face higher investment expenses.

In terms of education and training, a high level of adaption has been achieved. The implementation of environmental protection ranges from initial continuing training to university studies. However, a shortage of engineers and technicians has been identified in recent years. As such, policy has to focus on increasing the availability of skilled workers – in particular by the extension of the life-long learning system – in order to ensure the growth of the environmental sector.

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