OSW REPORT

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GERMANY'S ENERGY TRANSFORMATION

DIFFICULT BEGINNINGS

Edited by Anna Kwiatkowska-Drożdż

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Authors: Anna Kwiatkowska-Drożdż, Marta Zawilska-Florczuk, Konrad Popławski, Piotr Buras; co-operation: Kamil Frymark

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EXECUTIVE SUMMARY

Energiewende – Germany's long-term strategic policy project

Initiated in May 2011, several months after the Fukushima nuclear disaster, Germany's energy transformation (*Energiewende*) has been presented as an irrevocable plan, and – due to the speed of change required – it represents a new quality in Germany's energy strategy. Its main objectives include: nuclear energy being phased out by 2022, the development of renewable energy sources, the expansion of transmission networks, the construction of new conventional power plants and an improvement in energy efficiency. The cornerstone of the strategy is the development of renewable energy. Under Germany's amended renewable energy law, the proportion of renewable energy in electricity generation is supposed to increase steadily from the current level of around 20% to approximately 38% in 2020. In 2030, renewable energy is expected to account for 50% of electricity generation. This is expected to increase to 65% in 2040 and to as much as 80% in 2050.

The impact of the *Energiewende* is not limited to the sphere of energy supplies. In the medium and long term, it will change not only to the way the German economy operates, but also the functioning of German society and the state. Facing difficulties with the expansion of transmission networks, the excessive cost of building wind farms, and problems with the stability of electricity supplies, especially during particularly cold winters, the federal government has so far tended to centralise power and limit the independence of the German federal states with regard to their respective energy policies, justifying this with the need for greater co-ordination. The *Energiewende* may also become the beginning of a "third industrial revolution", i.e. a transition to a green economy and a society based on sustainable development. This will require a new "social contract" that will redefine the relations between the state, society and the economy. Negotiating such a contract will be one of the greatest challenges for German policy in the coming years.

Being the most ambitious project of the CDU/CSU/FDP coalition, the *Energiewende* seems to be "doomed to succeed", if only because there is no official scenario or plan B that would allow the government to withdraw from it if its implementation were to encounter serious difficulties. **The *Energiewende* has been, alongside the eurozone crisis, one of the major topics of the campaign ahead of the Bundestag elections scheduled for September 2013. It is therefore linked to Chancellor Angela Merkel's political credibility.**

Energiewende – chaos management

Even though the *Energiewende* is in line with the objectives of Germany's climate and energy policy defined back in 2002 by the SPD and Green coalition, its implementation has run into various obstacles.

One of the main problems with the *Energiewende* concerns financing. The largest share of the cost of subsidising the renewable energy sector is borne directly by individual end consumers and those companies which are not exempted from the electricity bill surcharge imposed to finance the development of renewable energy. The surcharge has been the fastest-growing component of electricity bills in Germany. In 2011, it was 3.53 cents per 1 KWh, with 1 KWh of electricity costing 25.2 cents on average, i.e. the surcharge accounted for 13.9% of the price of 1 KWh of electricity, compared to just 5.1% in 2008.

Moreover, social protests have been affecting the speed at which some infrastructural undertakings have been implemented, especially the expansion of transmission networks. Despite public support for the *Energiewende*, a legal problem has emerged, which is well summed up by the NIMBY (Not In My Back Yard) acronym, or another term: the BANANA Syndrome (Build Absolutely Nothing Anywhere Near Anything). The implementation of the transformation plans therefore hinges on how the federal, state, and local authorities regulate the involvement of the public. So far, only around 200 km of new transmission networks have been built, out of the nearly 4,000 km necessary.

The change in Germany's energy strategy was not preceded by any consultations with its European partners and has thus created numerous challenges for Germany's neighbours whose own project (e.g. to build nuclear power plants) suddenly became contestable, or whose transmission networks started to be used for stepped up transmission of electricity from wind farms, thus undermining their stability and increasing the risk of blackouts.

Energiewende as a driving force of the German economy

The *Energiewende* is expected to **prevent job losses or even to create new jobs** in Germany. Based on a comparison of employment figures in the energy sector and in other sectors of the German economy, the energy sector can be classified as one of the top-ten employers in Germany. The entire sector employed around 600,000 people in 2009, with conventional energy accounting for around 39% of this figure. The number of employees in the unconventional

energy sector is not very high in comparison with the other leading sectors, but its growth rate suggests that it will in future become an important part of the German economy. According to estimates from the Environment Ministry, employment in this sector will increase to 500,000–600,000 in 2030. This will, however, go hand in hand with the decline of conventional energy companies. It is, therefore, difficult to assess whether the overall number of jobs will actually rise.

Renewable energy technologies are one of the **fastest growing categories of exports**. The exact rate of this growth is, however, difficult to assess since no up-to-date figures on growth dynamics are available. In 2007, Germany exported nearly 9 billion euros worth of renewable electricity installations. Wind farm components accounted for 85% of this volume. Germany expects that exports of this technology in particular may become a German speciality because of the country's traditional competitive advantage in the machine-building sector. 45% of exports were sold to Europe, 26% to Asia and 25% to the United States.

Energiewende as a new dimension in Germany's foreign policy

There are several reasons why the *Energiewende* should be treated as a well-considered strategy rather than an ad hoc tactic of the German government. Firstly, the decision to go ahead with the transformation ended the "nuclear" dispute which had been forging deep divisions in German society for decades. Secondly, Germany believes that the *Energiewende* will allow it to escape from dependence on conventional energy resources. Finally, it is believed that investments related to the *Energiewende* will enable Germany to maintain its high position in international trade as a green technology exporter.

Implementing the German energy transformation model or at least some of its elements throughout the European Union could make the *Energiewende* more profitable and provide a boost for Germany's green technology exports. Extending the transmission networks and cross-border interconnections in the EU could also reduce the cost. German's policy will therefore aim at building a coalition of states as broad as is possible. The country's new environment minister Peter Altmaier has coined a name for this "Klub der Energiewendestaaten" (a club of states supporting the energy transformation). It would include a vanguard of states willing to implement energy transformation in their respective countries and to prove by this that switching to renewable energy offers economic opportunities since economic growth and

protection of the climate are not contradictory objectives but rather two sides of the same coin.

Raising the binding targets for reductions in greenhouse gas emissions in the EU and the ensuing increase of prices for emissions allowances would also be helpful for Germany's transformation. An expanded budget of the Energy-Climate fund, which will receive the total revenue from Germany's additional CO_2 emissions allowances, is supposed to be the most important new source of funding for the *Energiewende*.

After Europeanisation, the next step to make the *Energiewende* a reality should consist, according to Germany, in **making the project international** since the dual task of protecting the climate and ensuring durable energy security requires a global approach. As with Europeanisation, a global approach would aim to make the use of renewable energy sources more widespread, to enhance the market competitiveness of renewable energy technologies worldwide, to actively support the phasing out of other energy sources (especially nuclear and coal), and to invest in gas as the best transitional fossil energy source capable of supporting the development of renewable energy.

INTRODUCTION

In May 2011, several months after the nuclear power plant disaster in Fukushima, the German government took the long and anxiously awaited decision to phase out Germany's nuclear power plants to 2022 and to switch the German economy to renewable energy sources. However, instead of creating a solid basis for new policy, propped up by confidence from society and the private sector, the decision created enormous chaos and uncertainty, not only in Germany, but also in Europe. Launched in the summer of 2011, the *Energiewende* is still subject to debate concerning not only the future energy model, but also Germany's social and economic models. This debate is being followed closely across Europe because should the *Energiewende* project succeed in Germany, it will provide a basis for similar solutions in other countries.

The revolutionary speed at which the German economy is switching to renewable energy is proving to be an unusually difficult and costly challenge. The amendments introduced to a number of laws (from the nuclear law to the renewable energy law and the laws regulating the necessary extensions of energy grids) under time pressure and also under pressure from public opinion, are at present regarded as being insufficient. Therefore, works are in progress to further improve them. Implementation of the new strategy's key objectives – such as the extension of transmission grids and the construction of new conventional power plants – has been stumbling on growing economic and legal obstacles. The development of the green technology sector has also caused problems – its solar energy sector has been over-subsidised, while the offshore wind farm sector has on the other hand been under-subsidised. The strategy's success may also be undermined by the absence of comprehensive co-ordination and the financial burden that its implementation is imposing on society and the economy. Electricity prices have been rising, and the listings of the largest energy companies, including E.ON and RWE, plummeted immediately after the German government announced the *Energiewende* decisions. The companies were forced to change their long-term investment strategies wholesale. The German chancellor has yet to persuade experts, businesses and voters that "the energy U-turn is a huge opportunity" and that the process will go ahead only if "security of supplies, climate protection and its economic viability are ensured". German business associations have been and still are cautioning against a politically motivated, ill-considered and irreversible phasing out of nuclear energy. They are concerned about high electricity costs (and especially the unfair sharing of that burden), the instability of supplies, as well as the negative impact on the environment.

The decisions of the spring and summer of 2011 were no doubt taken in a highly strung atmosphere. The Fukushima nuclear disaster triggered panic among the German public, and that brought forward the decision to phase out nuclear energy. That decision had not been preceded by consultations with Germany's EU neighbours and partners, or even by any reliable calculations at the federal level or an analysis of the short, medium and long-term consequences of the step for the German economy and the country's position. The ongoing campaign before the Baden-Württemberg elections, crucial for the German Christian Democrats, also played an important role, as the Chancellor's decision had the potential of winning over a section of the Green party's voters.

However, emotions were not the only factor. The *Energiewende* certainly deserves to be treated as a strategic, long-term project in German policy. Firstly, the idea to implement a gradual shift towards a lead role for renewable energy was first conceived some time before the *Energiewende* project was announced. The decision to shut down nuclear power plants was a factor in the acceleration of the process, as nuclear energy had been the transition technology of choice in the original plan. Secondly, the decision to go ahead with the *Energiewende* ended the dispute over nuclear energy which had been going on for decades and which had created deep divisions in German society. Thirdly, Germans believe that the *Energiewende* will enable them to escape from their dependence on conventional energy resources (including gas imported from Russia). Finally, they also believe that investments related to the *Energiewende* will enable Germany to maintain its high position in international trade (as a leader in green technology), adding to the country's strong standing in traditional industry sectors.

I. THE SOCIAL AND POLITICAL CONTEXT

1. The federal government's position

In the coalition agreement concluded back in 2009, the Christian Democrats and the Liberals unanimously decided that Germany's nuclear power plants should remain in operation. Therefore, the sudden change of attitude towards nuclear energy on the part of cabinet members representing the two parties came as a surprise. It turned out that the formulation of a joint position did not even require long negotiations. Horst Seehofer, the deputy leader of the CSU and the prime minister of Bavaria, who used to be one of the most vocal advocates of nuclear energy, changed his mind and adopted the opposite view almost overnight; which surprised even some members of his own party. Politicians of the liberal FDP, who had previously argued that nuclear power plants should remain in operation, behaved in a similar fashion. Their stance could have been influenced by the fact that during the government debate that preceded the announcement of the nuclear phase out, the Liberals had managed to push through several demands that were important for them. These included: keeping at least one of the existing nuclear power plants in operation as a "cold reserve" to ensure energy supply during particularly cold winters, keeping in place the tax on nuclear fuel for nuclear power plants, and increasing the budget for subsidies for the thermal insulation of buildings to 1.5 billion euros a year[1]. The FDP considers the *Energiewende* to be a great challenge, but also an inevitable process. It also believes that the *Energiewende* offers an opportunity to ensure a stable energy supply for future generations. The Liberals also advocate increased investment in new coal and gas fired power plants. Those proposals are in line with the direction of the energy transformation outlined by Chancellor Merkel. The fact that the initial decision for a moratorium on the operation of nuclear power plants for three months, taken almost immediately following the Fukushima disaster, was jointly announced by Merkel and Guido Westerwelle, the then deputy chancellor and the leader of the Liberals, further demonstrated that there was consensus on the issue within the cabinet.

Consequently, the *Energiewende* became a priority undertaking for the CDU/CSU/FDP coalition and one of the few reforms on which there is relative consensus in the ruling coalition. The coalition members are aware that the *Energiewende* is a process that will be spread over many years, and that they will not be able to

[1] http://www.liberale.de/Ohne-Netzausbau-keine-Versorgungssicherheit/7719c12762i3p69/index.html

present any tangible results during the campaign for the elections to the Bundestag in 2013. In order to ensure re-election and to maintain voter confidence, the Christian Democrats and the Liberals must convince the public that the decision to radically change the country's energy strategy was right and that it is slowly starting to bear fruit. Because of the hasty launch of the *Energiewende* by Chancellor Merkel with almost unanimous support from her coalition partners in the spring of 2011, the new energy strategy is not only a priority for the federal government - it is also a project that cannot be allowed to fail. The chancellor justified the decision to close down all nuclear power plants by 2022 by saying that "it is not possible to simply come to terms" with the Fukushima nuclear disaster[2]. This played well not only with the public mood[3], but also with expert recommendations[4]. The implementation schedule for the *Energiewende* is extremely tight and many have been warning that 2022 is unrealistically ambitious for a complete phasing out of all reactors and the achievement of a considerable increase of the share of renewable energy in Germany's general energy mix[5]. Moreover, Germans see themselves as the forerunners of a new energy concept for the European Union and the world, based on the phasing out of nuclear energy and a gradual switching of the energy system to power from renewable sources[6]. As the single most ambitious project of the CDU/CSU/FDP coalition, the energy transformation seems to be "doomed to succeed", if only because there is no official scenario to withdraw from the *Energiewende*, even if the project stumbles on very serious difficulties (e.g. problems extending the transmission networks, too high costs of wind farm development, or problems with energy supplies during particularly cold winters).

Germany's energy policy spans various areas of state and business activity which fall within the remits of different ministries. Before the *Energiewende* was announced, this was not a problem because the competences of different ministries seldom overlapped. However, with an undertaking on the scale of the *Energiewende*, which requires the simultaneous involvement of several

[2] http://www.bundesregierung.de/Webs/Breg/DE/Service/Mediathek/Videos/videos_node.html?id=139490

[3] 80% of respondents in a survey by the Forsa Institute in March 2011 declared they were wary of nuclear energy in the aftermath of the Fukushima disaster, and 63% were in favour of shutting down reactors in Germany either immediately or within the next two years.

[4] For example those presented by the Ethics Commission established by the Chancellor, which is composed of seventeen members including scientists, members of the clergy, business people, politicians and representatives of trade unions.

[5] For example: http://www.spektrum.de/alias/energie/zehn-jahre-reichen-nicht-zum-umstieg/1146932

[6] http://www.bmu.de/energiewende/fragen_und_antworten/doc/47498.php

ministries, the unclear division of tasks between the various ministries in charge of implementing the *Energiewende* has created informational chaos and confusion with regard to the division of powers and competences. This refers in particular to the Ministry of Economy and the Ministry of the Environment, i.e. the two ministries crucial for the success of the *Energiewende*. Even though the Ministry of the Environment has been playing a lead role since the decision to go ahead with the *Energiewende* was taken, some of the central offices important for the implementation of the *Energiewende* are still overseen by the Ministry of Economy, which hitherto has been the principal ministry in charge of energy. The German Energy Agency (DENA), in charge of the development of renewable energy, energy effectiveness and smart grids, is a case in point.

Disputes between the ministers for economy and for the environment also contributed to the impression of chaos for some time. The most widely publicised clash took place in early 2012 and concerned the plans to reduce the subsidies paid to the manufacturers and users of solar batteries, and the rates of co-financing for building upgrades aimed at improving energy effectiveness. Even though the dispute concerned real policy issues, it developed against a background of the ambitions and party affiliations of the ministers involved. The ambition of the economy minister Philipp Rösler (FDP) was geared towards demonstrating that, despite the new division of tasks ensuing from the energy transformation, his ministry was still important. The then minister for the environment Norbert Röttgen (CDU) had similar ambitions. Moreover, the dispute took place in a period when the FDP, of which Rösler is the leader, was experiencing a dramatic slump in support levels. It was therefore transformed into his fight for political survival as the party leader and an effort to mark the presence of the FDP on the German political scene (polls have shown the FDP's level of support oscillating around the 5-percent election threshold for many months and the party has been losing most elections to federal state parliaments).

The diffused responsibility for the *Energiewende* and the overlapping competences of ministries have triggered criticism from politicians (including the coalition parties), the media, business associations, experts and public opinion. It has often been suggested that the optimum solution would be to concentrate all tasks related to the *Energiewende* within one separate ministry for energy[7].

[7] See for example: http://www.handelsblatt.com/politik/deutschland/csu-landesgruppenchefinhasselfeldt-fordert-energieministerium/5998332.html, http://www.dradio.de/dkultur/sendungen/interview/1642127/, http://www.wiwo.de/politik/deutschland/energiewende-wir-brauchen-einen-energieminister/6358504.html

Chancellor Merkel has ruled out this solution and has started to increasingly treat the energy transformation as her own domain, even though the existing division of competences still applies formally.

Chancellor Merkel demonstrated this much in May 2012 when she suddenly replaced the minister for the environment. Based on a motion from Merkel, Norbert Röttgen was dismissed and Peter Altmaier nominated as the new minister for the environment. The decision came in the aftermath of the lost elections in North Rhine-Westphalia where Röttgen was CDU leader. The main reason, however, was to speed up the implementation of the *Energiewende* and improve co-ordination of the whole project. In addition, Chancellor Merkel wanted to demonstrate that she was taking over co-ordination of the activities that until then had been carried out by several ministries and that she had a direct influence on the way the nuclear phasing out process was being put into practice. Peter Altmaier, the former secretary of the CDU/CSU parliamentary group in the Bundestag, is a loyal and very efficient official without political ambitions of his own. This for Merkel is a guarantee that he will treat the *Energiewende* as a priority and follow the Chancellor's guidelines. The change in personnel was also intended to help end the dispute within the coalition between the minister for the environment and the minister for economy and technology Philipp Rösler about the choice of specific solutions for the *Energiewende*[8]. The new environment minister, whose appointment brought criticism from various political circles (including members of the CDU/CSU/FDP coalition), has been gaining recognition ever more successfully, in particular for his skills as an efficient mediator and negotiator. His efficacy is visible, for instance, in the fact that disputes between his own ministry and the Ministry of Economy have been resolved, and successive compromises have been reached in negotiations with the federal states.

On 16 August 2012 Peter Altmaier presented a ten-point plan for the *Energiewende*. The plan sets out proposals which are to serve as guidelines for the transformation of Germany's energy model during the remainder of this term of the Bundestag, i.e. until September 2013. It is also the most important document outlining the current state of play with regard to the

[8] This concerned in particular the changes to the original model of subsidies for renewable energy under the Erneuerbare Energien Gesetz; the underlying causes of the conflict also included a dispute over *Energiewende*-related competences and the fact that both the CDU and the FDP were trying to take advantage of it. Cf. http://www.handelsblatt.com/politik/deutschland/roettgen-und-roesler-der-streit-der-minister-um-den-oekostrom/6074848.html (18.09.2012).

coalition's plans and intentions. The programme points to the *Energiewende* as the most important "economic and political challenge" since German reunification and "the greatest environmental challenge ever"[9]. The document lays down three basic conclusions: (1) it is necessary **to slow down the development of renewable energies**[10] and make the process market-oriented with a view to ultimately adjusting it to the economic needs and capacities of Germany; (2) **social dialogue** is an indispensable element of the *Energiewende*, and (3) **Germany's activities concerning the *Energiewende* need to become internationalized.**

The diagnosis of the first conclusion of the Altmaier plan is that the current condition of the transmission infrastructure and the costs of the *Energiewende* do not match the output of renewable energy. The plan shows that green energy production will exceed the initial target of 35% before 2020. In order to balance and evenly distribute the energy transformation costs Altmaier suggests, inter alia, that private capital should become more involved in reshaping Germany's energy model[11], and warns against placing an excessive burden on German industry due to rising energy prices that risk undermining its competitiveness. The ministry proposes an acceleration of the transition of the *Energiewende* towards a market-oriented model in the medium term by amending the law that prioritises renewable energy (Erneuerbare-Energien-Gesetz EEG) and also provides for a system of subsidies for renewable energy producers. Once the subsidies are cut, the producers will have to adapt to market conditions, which will also drive energy prices down. Finally, according to Altmaier, in order for the *Energiewende* to succeed, transmission networks and storage facilities need to be extended, and works need to be undertaken on new technologies for accumulating energy (e.g. by developing the "Power to Gas" concept). The efforts to extend and develop the existing transmission grids will slow down

9 Mit neuer Energie, 10 Punkte, für eine Energie- und Umweltpolitik mit Ambition und Augenmaß, Arbeitsprogramm des Bundesumweltministeriums für die laufende Legislaturperiode, p. 6, http://www.bmu.de/strategien_und_bilanzen/doc/49041.php (18.09.2012).

10 Mr Altmaier mentioned it in a conference organised by *Handelsblatt*, 28.08.2012. Cf. http://www.handelsblatt.com/politik/deutschland/handelsblatt-konferenz-altmaier-will-energiewende-entschleunigen/7066204.html (18.09.2012).

11 One of the proposals is to use funds gathered by the private insurance companies. A report on this subject has been prepared by the federal government's Research Council for Global Climate Change. See: Finanzierung der globalen Energiewende, http://www.wbgu.de/fileadmin/templates/dateien/veroeffentlichungen/politikpapiere/pp2012-pp7/wbgu_pp7_dt.pdf (19.09.2012)

the implementation tempo of the *Energiewende* because they will face investment financing and location problems and will require winning the citizens' approval for the planned changes[12].

Secondly, the plan also emphasises the need for greater public involvement in the implementation of the *Energiewende* and better co-ordination of the entire project. To this end, the Ministry of the Environment will establish a new department for fundamental social and political issues and citizen participation, in charge of public consultations and co-operation with stakeholders at the early stages of project planning. The emphasis on stronger social dialogue stems from previous experience, for instance: with the Stuttgart 21 project[13], the transportation of radioactive waste via Germany or the selection of radioactive waste disposal sites.

Altmaier also stresses that financing of the energy transformation should be spread over a longer time period so as to avoid excessively burdening German citizens with the costs of the *Energiewende*. One of the specific solutions proposed in the plan provides for free consultancy on improving the effectiveness of energy use, due to which households would be able to optimise their electricity spending. The idea of dialogue proposed by Altmaier also extends to a co-ordination of the activities of individual federal states in order to implement the *Energiewende* more effectively and efficiently[14]. Altmaier also believes that public involvement will be key to solving issues concerning shale gas extraction, which the ministry considers to be controversial, and which may lead to protests in local communities[15]. The feasibility assessment of shale gas extraction through fracking, published by the Ministry of the Environment and the Federal Environment Agency,

[12] Cf. http://www.ftd.de/politik/deutschland/:netzausbau-stau-auf-der-stromautobahn/70086878.html (19.09.2012).

[13] A project to extend the Stuttgart railway station, which caused huge social protests that lasted for several months.

[14] The main objective is to lay down renewable energy output targets for individual federal states in order to adjust their energy mixes to current economic needs, and to co-ordinate co-operation between the federal administration and federal states in order to avoid the duplication of infrastructure projects. Cf. http://www.handelsblatt.com/economy-business-und-finance-altmaier-will-bei-energiewende-bessere-zusammenarbeit-mit-laender/7140428.html (20.09.2012).

[15] Cf. Mit neuer Energie..., *op. cit.*, p. 18.

which the Altmaier report mentions, authorises fracking only if rigorous water resource and environmental protection conditions are met[16].

Finally, the third conclusion of the Altmaier plan covers the need to internationalise the *Energiewende*. If successful, this will consolidate and strengthen Germany's global position in the renewable energy sector in coming years. The same applies to the development of the individual sectors of the energy industry, including in particular the manufacture of photovoltaic subassemblies. The plan to create a club of countries supporting renewable energy is to be an important step towards internationalising the German energy transformation. Apart from promoting the *Energiewende*, its tasks should include, according to Altmaier, supporting economic growth based on renewable energy and action taken for protection of the climate. He also advocates a greater harmonisation of the international emissions trading standards so as to achieve synergies resulting from closer alignment. Furthermore, the plan calls for the debate on the European energy policy to be shifted up a gear, especially with regard to emissions trading, for EU climate targets to be maintained at 30% and for discussions about the prospective 2050 targets to be launched.

2. The *Energiewende's* impact on Germany's changing social model[17]

Taken in June 2011, the decision to go ahead with the *Energiewende* brought one of the most important disputes that had divided the society of Germany (West Germany before 1990) to an end, i.e. the dispute over nuclear energy. In 2001, when the government of the SPD and the Greens decided to phase out nuclear power plants, the conservative and liberal opposition objected to the move. Ten years later, all political forces are in favour. This agreement reflects the consensus among the general public, which developed as a result of the changes that have occurred in the sphere of values since the end of the 1960s. Those changes manifested themselves, *inter alia*, in growing environmental awareness and in protests against the construction of nuclear power plants. The Green party was established in 1979 as a political consequence of this evolution, and has been

[16] Gemeinsame Pressemitteilung des Bundesumweltministeriums und des Umweltbundesamtes: Fracking nur mit strengen Auflagen zulassen, Nr. 118/12, Berlin, 06.09.2012, http://www.bmu.de/pressemitteilungen/aktuelle_pressemitteilungen/pm/49111.php (19.09.2012).

[17] The author of this section, Piotr Buras, prepared this part of the report during his research stay at the Wissenschaftszentrum Berlin.

represented in the Bundestag since 1983. Over time, the environmental ideas and aversion to nuclear energy have become mainstream. When the Fukushima disaster took place in March 2011, 63% of Germans backed the decision to phase out the country's nuclear power plants over the course of five years.

Public consent to the phasing out of nuclear power was reflected in the May 2011 report of the Ethics Commission composed of representatives from various political and social groups. The report provided a basis for the government's decision on the *Energiewende,* which it defined as a common task for society as a whole[18]. A year later, in summer 2012, public support for phasing out nuclear energy remained high. According to figures from the Allensbach Institute, 73% of respondents consider it to be the right decision, and only 16% believe it was a mistake. Support for the *Energiewende* is linked with political affiliation only to a limited extent – 79% of SPD voters back it and 64% of the CDU's electorate[19].

However, this broad popular support for changes in the energy policy does not mean that the implementation of those changes will proceed smoothly. The general agreement that nuclear energy should be phased out does not automatically mean that all consequences of the accelerated switch to renewable energy, such as for instance its financial consequences, will be easily accepted. Only 32% of Germans accept higher energy prices as a result of the changes, while 53% are against them. Thus, while the direction of change is not contested, the specific projects and implementation stages of the *Energiewende* may lead to discontent, or even inspire resistance from the public. Therefore, the *Energiewende* is a challenge not only for the German economy, but also for the country's politics and democracy.

Implementation of the project requires stronger state intervention in energy policy and also a more active role for the state. The task of switching the economy to renewable energy cannot be left to market forces alone. This refers, for instance, to setting the price for electricity in the markets, to subsidies and to the rules of the "power markets" where the state will now have to act more strongly as a regulator[20]. This role needs to be strengthened also because the changes should be fast, since all nuclear power plants will be decommissioned by 2022. The speed of the planning, preparation and implementation

[18] Deutschlands Energiewende – Ein Gemeinschaftswerk für die Zukunft, Ethik Kommission Sichere Energieversorgung, Berlin, den 30. Mai 2011.

[19] Renate Köcher, Schwierige Wende, *FAZ*, 21.06.2012.

[20] Cf. Fritz Vorholz, Grieft ein!, *Die Zeit*, 4.08.2011.

of investments is of key importance for the government and businesses alike. In 2011, a law on the accelerated development of electricity grids was enacted, which grants wider competences to the federal government (at the expense of the federal states and municipalities). The opponents of the *Energiewende* and the environmental transformations have therefore been cautioning against "ecodictatorship", excessive growth and a centralisation of the state, and restrictions on the operation of the free market.

On the other hand, the initiators of the *Energiewende* and social organisations have been pointing out that in order for the "project of the century" to succeed, citizens must be actively involved in its implementation[21]. First of all, the public's approval must be obtained for the large-scale infrastructural projects necessary for the new energy supply model to function, i.e. especially the 3,800 kilometres of new high-voltage transmission lines needed to connect the wind farms in the north with energy consumers in the south, as well as extensions of local electricity grids, new wind farms and energy storage facilities. That is because all those projects will entail significant changes to the environment, the local landscape and to people's standard of living. A stronger involvement from citizens in the democratic decision-making process with regard to the planned undertakings is therefore necessary for practical reasons (protests could render the projects impossible to carry through or delay their implementation), but also for political reasons (to consolidate and strengthen consensus on the *Energiewende*).

Reconciling the two objectives, i.e. on the one hand strengthening the role of the state and implementing infrastructural projects in a timely fashion, and ensuring the broader democratic participation needed to legitimise the *Energiewende* on the other, will be one of the greatest challenges for the federal government. It will require adjustments to the set of instruments offered by the German political system, especially with regard to the involvement of citizens in decision-making. The *Energiewende* has thus become the focal point for the debate on the future of German democracy. The project is being implemented at a time when the representative institutions and the political class are experiencing a crisis of confidence[22] and citizens are more and more often becoming mobilised against the decisions of the elite.

[21] E.g. the president of the Ethics Commission, Klaus Töpfer.

[22] Cf. Serge Embacher, Demokratie! Nein danke?, FES, Berlin 2009.

2.1. Social protests

Infrastructural projects have been the most likely targets of civil protests in recent years. The most widely publicised cases included the protests against the construction of a new railway station in Stuttgart[23], new runways at the Frankfurt airport, and the extension of the Munich airport. All three cases involved opposition to investments that ran counter to the interests or convictions of the local communities, and also encountered problems with procedural issues, i.e. insufficient information and not enough citizen involvement in the decision-making processes of the projects in question. The word *Wutbürger* (angry citizen) started to be commonly used to describe the emerging resistance of citizens dissatisfied with decisions taken above their heads. Some believe the *Wutbürger* to be a manifestation of the conservatism typical of German society with its aversion to progress and large technological projects (hence the old objections against nuclear energy, but also against transmission networks for wind power). Others regard it as proof that civil society is stirring itself, with people demanding a more direct say in political decisions that until now have been reserved for parliaments and traditional political parties; the ACTA agreement, the growing popularity of the Pirate Party or consumer movements could all serve as examples of this. Both interpretations lead to the conclusion that in order for the *Energiewende* to succeed, relations between politics and the public have to be renegotiated, especially since the scale of the necessary investments in transmission networks is on an entirely different scale than that of the Stuttgart railway station project, which gripped the attention of German public opinion for months.

Projects to extend energy infrastructures gave rise to protests even before the *Energiewende* decision was taken in June 2011. A much-publicised conflict took place in Thuringia over a section of the so-called Thuringia Power Bridge between Halle and Schweinfurt, which would cross Thuringia Forest. The power bridge is intended to transmit wind power from the north of Germany to Bavaria, and has been on the EU list of priority energy investments since 2006. However, the project has triggered protests by local inhabitants and

[23] The mobilisation of the local community against the extension of the "Stuttgart 21" transport hub. The protests lasted for many months and strengthened the Green party which then formed a coalition government with the SPD after the state elections in March 2011. Cf. http://www.osw.waw.pl/pl/publikacje/best/2010-10-06/protesty-obywatelskie-oslabiaja-chadecje-w-badenii-wirtembergii (12.10.2012) and http://www.osw.waw.pl/pl/publikacje/best/2011-03-30/wybory-do-parlamentow-landowych-wyznacznikiem-zmian-na-niemieckiej-scenie (12.10.2012).

environmental organisations. In Lower Saxony, the inhabitants have launched the "Pro Erdkabel" initiative to demand an underground cable instead of the planned transmission line of 70-metre pylons between Braunschweig and Bad Hersfeld (the underground solution is four times as expensive)[24]. In Schleswig-Holstein, where the plan is to increase the output of wind farms three-fold by 2015, local civil initiatives have been launched in many places to protest against the construction of wind farms and high-voltage lines[25]. Currently in Germany there are around seventy civil initiatives against wind power, and a similar number of initiatives oppose the extension of transmission networks. Half of them were created in the years 2007–2009. According to a 2011 Allensbach survey, 76% of Germans declare they general understand such protests, and 68% accept even protests against projects that have already been approved for implementation[26].

The same initiatives which in the past were directed against nuclear power plants are now often being turned against projects necessary for nuclear energy to be replaced with "clean energy". Conflicts are already arising between two environmental standpoints: the need to protect the natural environment on the one hand, and the need to develop environmentally friendly energy resources on the other ("eco vs. eco"). The dispute about the pump-storage facility in Schwarzwald is a classic example. Pump storage is the most effective method of energy storage available today, but in this particular case it would require dams to be built over a 150-hectare area and would affect large swathes of forest land in Hotzenwald. The inhabitants of the nearby village have been protesting against the project and against the policy of the Baden-Württemberg government led by a Green politician, Winfried Kretschmann[27].

Environmental organisations such as BUND, Naturschutzbund, Greenpeace and Robin Wood, which are strong in Germany, have been playing an important role in organising the protests and media campaigns against infrastructural investments. In 2007, some of them established the Klima-Allianz (Climate Alliance), which also includes numerous other social organisations and

[24] Ralph Bollmann, Im Netz der Bürgerproteste, *Frankfurter Allgemeine Sonntagszeitung*, 3.06.2012.

[25] Marlies Uken, Bürger fürchten sich vor Elektrosmog, Die Zeit Online, 28.02.2012.

[26] Marco Althaus, Schnelle Energiewende - bedroht durch Wutbürger und Umweltverbände? Protest, Beteiligung und politisches Risikopotential für Großprojekte im Kraftwerk- und Netzausbau, TH Wildau, Wissenschaftliche Beiträge 2012, *op.cit*., p. 2.

[27] Annika Stenzel, Öko gegen Öko, *TAZ*, 15.06.2011.

trade unions representing a total of ten million citizens. The alliance has been mainly acting against the construction of coal-fired power plants. Its protests were successful in several places including Berlin and Krefeld. The instruments that the environmental organisations resort to include not only political pressure and media campaigns, but also legal measures such as filing court cases against energy projects that could pose a threat to the environment. According to a May 2011 ruling of the European Court of Justice, they may invoke EU laws to this end, which further strengthens their position[28].

2.2. Democratising democracy

The dispute over the plans to re-build the railway station in Stuttgart in particular convinced the political elite and the media that the role of citizens in large infrastructural projects should be reconsidered. Most experts conclude that the roots of the conflicts that have happened to date very often lay in the fact that the citizens were not sufficiently well-informed about government plans, that there was too little transparency and that citizens were included in the decision-making process at too late a stage, i.e. when they could only protest, but could no longer influence the shape of the project[29]. There is even a report by the Federation of German Industry (BDI), the country's main employers organisation, which recognises the need to achieve a "new consensus" with regard to public approval of infrastructural projects. The report claims that this is a prerequisite of the success of the *Energiewende*[30].

Politicians, too, are aware of the risk of the success of the *Energiewende* being undermined or that its implementation may be delayed due to social protests stemming from insufficient citizen involvement in successive phases of infrastructural project planning and implementation. The law on energy supply (EnWG) and the previously mentioned law on accelerated grid development (NABEG) were amended in the summer of 2011. In both cases special attention was paid to ensuring greater transparency in the decision-making processes and opportunities for citizens to have their say. The amended laws provide that resistance to planned investments should be tackled at as early a stage

[28] Althaus, *op.cit.*, p. 9.

[29] See: Energiewende und Bürgerbeteiligung: Öffentliche Akzeptanz von Infrastrukturprojekten am Beispiel der "Thüringer Strombrücke". Zusammenfassung der Studie, Germanwatch, Mai 2012.

[30] Quoted after: Althaus, *op.cit.*, p. 4.

as is possible and that lawsuits, which risk causing significant project delays, should be avoided or, if they do take place, their duration should be limited[31].

Public consultations were organised as part of the works on the Network Development Plan (*Netzentwicklungsplan*) to be adopted by the end of 2012, which will lay down the routes of the projected new electricity transmission lines. For six weeks (ending on 10 July 2012) citizens were able to submit their comments through an online platform set up for this purpose. The Federal Network Agency (*Bundesnetzagentur*) then had eight weeks to adjust the plans and then present them again for public discussion. The Network Development Plan will subsequently be adopted by the Bundestag. Citizens will also be able to have their say on the specific routing of transmission lines at the local level. The largest number of conflicts will presumably arise at this stage since the original public consultation concerned only very general plans.

In the spring of 2012 the minister for transport Peter Ramsauer presented a draft "Manual of civil participation" which contains a "catalogue of practical and quickly implementable tips for good citizen participation in large projects in the area of transport"[32]. The minister's proposals were presented as a reaction to the previous negative experiences, but his critics have alleged that the manual is only "a manifestation of the crisis of confidence, which the minister is trying to overcome" because the measures it proposes to ensure citizen involvement do not go beyond the right to be heard and submit comments[33].

In any case, the streamlining of procedures and making them more transparent and more open to citizens may not be sufficient if the *Energiewende* is to gain durable legitimacy. The advocates of a deeper "democratisation of democracy" (Claus Leggewie) have pointed out that a project on this scale requires constant citizen involvement, and not a one-off approval by the people for specific undertakings. To enable such involvement, the federal government's Research Council for Global Climate Change has proposed that "Chambers for Future" (*Zukunftskammer*) be established at commune, regional, and national level. The chambers would have no decision-making powers, but would serve to strengthen the deliberative nature of democracy by including citizens in

[31] Tobias Montag, Netzausbau ohne Bürger?, Analysen und Argumente, Ausgabe 103, Mai 2012, Konrad Adenauer Stiftung, p. 3.

[32] Planung von Großvorhaben im Verkehrssektor. Handbuch für eine gute Bürgerbeteiligung. Entwurf, Bundesministerium für Verkehr, Bau und Stadtentwicklung, Berlin (2012).

[33] Christian Bommarius, Hauptsache Placebo, *Frankfurter Rundschau*, 16.03.2012.

discussions about the development of their local communities over the following 20–30 years[34].

Ideas to ensure wider citizen acceptance for the *Energiewende* are not limited to the sphere of decision-making. The financial incentives are also important; given the scale of the changes taking place in connection with the *Energiewende*, there may result significant transformations in the economic and ownership structures in Germany. At the regional level, more and more citizens are taking over responsibility for the energy supply by establishing co-operatives and by buying energy companies previously held by municipalities or large corporations. This applies in particular to the (inland) wind energy sector where "citizen wind farms" (*Bürgerwindpark*) owned by local communities are gaining popularity[35]. Schleswig-Holstein has plans for citizens to have a possible financial involvement in the construction of transmission networks. They will be able to become co-owners and to draw on the profits of energy transmission. This form of "enfranchisement" of citizens is expected to improve the chances of the successful implementation of socially controversial projects. The German Association of Towns and Municipalities has called on the federal government to introduce licence fees payable to municipalities by owners of transmission lines running through the territory of such municipalities. This would extend the ability of the municipalities to co-operate in energy production and would minimise conflicts[36].

2.3. A new social contract

Social protests may delay the implementation of some infrastructural undertakings, but they should not undermine the *Energiewende* as whole. Much depends on how the federal, state, and local governments regulate citizen participation. The experience so far shows that a total rejection of projects is rare (coal-fired power plants, which inspire fierce resistance, being an exception here). In the usual scenario citizens only wish to be informed and to have a say in decisions on specific issues such as the detailed routing of a transmission line or ways to protect the environment. Conflicts escalate when these two elements are not sufficiently guaranteed.

[34] Claus Leggewie, Mut statt Wut. Aufbruch in eine neue Demokratie, Hamburg, 2011, p. 159-164.

[35] Windenergie in Bürgerhand. Energie von der Region für die Region, Bundesverband für Windenergie, Berlin, Juni 2012.

[36] Deutscher Städte- und Gemeindebund fordert Konzessionsabgabe für Stromtrassen über Gemeinden. Gerd Landsberg im Gespräch mit Friedbert Meurer, 29.05.2012, Deutschlandfunk.

This "expansion of democracy", which was made politically necessary by the *Energiewende*, is a response to civil society's expectations and its recent mobilisation, and it does not have to be an obstacle for the *Energiewende*. However, it is likely to produce a feedback loop whereby citizen activity will grow further in line with this civilisational project. The impact of the *Energiewende* is not limited to the sphere of energy supplies. In the medium and long term one should expect changes not only to the economy, but also to the way society and the state operate. The *Energiewende* may turn out to be the beginning of a "third industrial revolution" and a "great transformation" towards a green economy and society based on sustainable development. Torsten Albig of the SPD, the prime minister of Schleswig-Holstein, claims that by throwing its lot in with renewable energy, his state may play a role similar to that played by the Ruhr valley in the 19th and 20th centuries. The lesson from the previous technological watersheds in energy use (the transition to coal in the 19th century and to oil in the 20th century) is that such turns always entail deep social transformations affecting people's ways of life and how it is organized along with the organisation of economic structures and political systems. As in the previous cases, now too it will be necessary to conclude a new "social contract" that will redefine relations between the state, society and the economy. Negotiating this new social contract will be one the most important challenges for German politics in the coming decades. "Democratising democracy" is an element of this social change.

II. THE LEGAL SETTING OF *ENERGIEWENDE*

1. Legislation[37]

Germany's new energy strategy is regulated by eight laws[38] adopted on 6 June 2011 by the federal government (and then put to vote at the Bundestag). These are: the law amending the nuclear energy law, the law on supporting renewable energy generation, the law on the accelerated development of transmission networks, the law regulating energy supply, regulation amending the law on public procurement, the law establishing the Energy and Climate Fund, the law on tax breaks for building upgrades that enhance energy efficiency, and the law on strengthening the climate-friendly development of towns and municipalities. Four ministries were responsible for drafting the laws: the Ministry of the Environment, Nature Conservation and Nuclear Safety, the Ministry of Economy and Technology, the Ministry of Finance and the Ministry of Transport, Building and Urban Development.

The majority of those laws entered into force in the summer of 2011. The law on supporting renewable energy generation (the renewable energy sources act), one of the most important bills for the *Energiewende*, was amended only in late June 2012 and entered into force retroactively as of 1 April 2012. This regulates the feeding of renewable-generated electricity into the grid and the payment of subsidies for the production of renewable energy. Works on the amendment started in January 2012. The most important sticking point concerned reducing subsidies for the manufacture and use of photovoltaic cells, which until then had been very popular. The solar industry is one of the most important sectors of industry in the new federal states of Germany. For this reason some federal states including Saxony, Saxony-Anhalt and Thuringia vetoed the draft during a vote at the Bundesrat in May 2012. A compromise that satisfied both the MPs

[37] As of 1 September 2012.

[38] Dreizehntes Gesetz zur Änderung des Atomgesetzes, Gesetz zur Neuregelung des Rechtsrahmens für die Förderung der Stromerzeugung aus erneuerbaren Energien (EEG), Gesetz über Maßnahmen zur Beschleunigung des Netzausbaus Elektrizitätsnetze (NABEG), Gesetz zur Neuregelung energiewirtschaftsrechtlicher Vorschriften (EnWGÄndG), Verordnung zur Änderung der Verordnung über die Vergabe öffentlicher Aufträge, Gesetz zur Änderung des Gesetzes zur Errichtung eines Sondervermögens "Energie- und Klimafonds" (EKFG-ÄndG), Gesetz zur steuerlichen Förderung von energetischen Sanierungsmaßnahmen an Wohngebäuden, Gesetz zur Stärkung der klimagerechten Entwicklung in den Städten und Gemeinden.

and the representatives of the federal states was reached during a meeting of the Mediation Committee of the Bundestag and the Bundesrat on 29 June 2012.

Similar problems were encountered during works on the law on carbon capture and storage (CCS). This bill is not part of the package of laws regarded by the federal government as the core of the *Energiewende* legislation, but it is directly connected with the implementation of the new strategy. The Bundesrat rejected the CCS law in September 2011. As with the renewable energy law, the Mediation Committee of the Bundestag and the Bundesrat adopted a compromise version of the draft after lengthy deliberations on 29 June 2012, and then the two chambers of the legislature adopted a bill authorising CCS. The final law, however, contains a clause allowing individual federal states to prohibit CCS in their territory.

The law on energy efficiency, which regulates tax breaks related to upgrades and the thermal insulation of buildings, is currently in the process of being amended and it is another important legal act for the *Energiewende*. The law provides for financial support for upgrades of thermal insulation and heating installations of buildings to the amount of 1.5 billion euros a year. In this case the fact that it has not yet been adopted is due to opposition from the SPD and the Greens who have been calling for higher financing. The amendment has also been criticised by the federal states, which do not accept the proposals concerning tax breaks as an incentive for improving the energy efficiency of buildings since lower tax revenue would adversely affect the budgets of federal states. Works on formulating Germany's position on the EU directive on energy efficiency have also given rise to controversy[39]. It was one of the most important areas of the dispute between the ministers for economy and for the environment. The draft directive adopted by the European Parliament, the European Commission and the European Council provides, inter alia, that rules for improving energy efficiency should be enacted by member states and that each member state should reduce its energy consumption by 1.5% a year. Since there is no agreement between the federal administration and the federal states on this issue (even on matters that only concern Germany) implementing the directive in Germany could pose problems. This is one of the reasons why Berlin demanded recognition of this kind of work (e.g. building upgrades) undertaken and completed in the past.

[39] http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

The ten-point action plan adopted by the government still before the *Energiewende* was announced in September 2010 along with the previous energy strategy is also an important document for the energy transformation. The plan provides for, *inter alia*, the development of transmission networks, loans for the development of offshore wind farms and financing for upgrades of the energy efficiency of buildings. The plan's implementation to date was assessed in March 2012 and was found to have been successful by the minister for the environment and the minister for economy[40].

However, nuclear waste storage remains an unresolved issue, and the problem is becoming ever more urgent, due to the accelerated schedule for shutting down nuclear reactors. Works are in progress on the selection and adaptation of an appropriate storage facility. As with carbon capture and storage, difficulties in reaching agreement with the federal states and with opposition parties are the greatest obstacle to selecting the storage site for this hazardous waste.

2. Division of competences between federal ministries

At the federal level, oversight of the energy policy is divided between several ministries in charge of its different aspects. The Ministry of Economy and the Ministry of the Environment play the most important role, and the latter has gained wider competences since the *Energiewende* was announced and has become the leading actor with regard to planning and implementation.

The Ministry of Economy is in charge of, inter alia, electricity and gas supplies to consumers and the industry, the development of transmission networks, fair competition in the German energy market, subsidies to the production and use of renewable energy and also energy research, which is directly coordinated by the Ministry of Education and Research. Within the Ministry of Economy, energy policy falls within the remit of a secretary of state.

The Ministry of the Environment, Nature Conservation and Nuclear Safety is in charge of climate policy, enhancing energy efficiency, emissions trading and the development of renewable energy. The Ministry of the Environment also oversees nuclear energy, i.e. is in charge of the power plants still in operation and the transport and storage of radioactive waste.

[40] Cf. the federal government's report on the implementation of the ten-point plan regarding the energy concept, http://www.bmu.de/pressemitteilungen/aktuelle_pressemitteilungen/pm/48545.php

The Ministry of Finance is responsible for the special funds to support the energy transformation, including the Energy and Climate Fund, as well as energy taxes[41]. Energy policy is within the remit of the Ministry's Division IB3 in the Directorate for Fiscal Policy and Macroeconomic Affairs; International Financial and Monetary Policy.

The Ministry of Transport, Building and Urban Development is in charge of, *inter alia*, developing ways to reduce energy consumption in Germany and strengthening climate protection measures in construction law. The unit in charge is Division UI4 for Climate and Environmental Protection Policy.

The Ministry of Food, Agriculture and Consumer Protection is in charge of legislation on biofuels, supporting the production of renewable resources (such as wood and biomass), and informing consumers about energy prices, legal regulations and the energy market. The unit responsible for those matters is Division 524 "Bioenergy" in the Directorate for Sustainability and Renewable Resources.

External energy policy, including in its European aspect, is in the remit of Division 410 in the Directorate-General for Economic Affairs and Sustainable Development at the Ministry for Foreign Affairs.

Finally, the Chancellery is also an important actor at the federal level. Its role increased after the *Energiewende* was announced; this refers in particular to Division 43 "Industrial and Energy policy. Innovations" in the Directorate for Economic and Financial Policy. Officially, the Chancellery is not a leading actor in the *Energiewende* since its task is to mediate between the different ministries. Most likely, though, it probably formulates guidelines for them, since the sudden turn in energy policy is Angela Merkel's own idea and an important project of hers.

3. Competences of the federal government and states

The *Energiewende* was decreed at the federal level and it is the federal government in Berlin that is responsible for related legislation and oversight of federal and state-level offices. However, the federal states enjoy broad autonomy in terms of energy policy. Germany's constitutional principle of concurrent

[41] I.e. taxes on energy products used as heating materials and motor fuel.

legislative power (Article 74.1 of the German Basic Law) applies to energy policy. This means that policy decisions concerning energy are made at both the federal and the state level[42]. Achieving the objectives of the *Energiewende* requires active co-operation between the federal states, and in many areas its very feasibility depends on this co-operation.

The German federal states are responsible for the implementation of federal laws and regulations in their respective territories. They are also able to influence the content of federal legislation through the Bundesrat. In principle, the competences of the federal states extend to all areas of energy policy which directly concern their territories or require financing from state budgets. These include such issues as the development of inland and offshore wind farms, the routing of transmission networks, the construction, maintenance and oversight of conventional and nuclear power plants, the granting of construction and operation permits for power plants, as well as the storage of nuclear waste. The German federal states attach great importance to their role in the implementation of Germany's energy policy. For example, all of them have federal state ministries for energy (see Table). Most federal states have also enacted their own strategies for the development of their energy sectors[43]. There is no co-ordination between the strategies of individual federal states, and the strategies themselves are not always in line with the objectives of the federal government. This situation is a consequence of the fact that the central administration has informally taken over responsibility for the *Energiewende* and any related decisions. The governments of federal states officially accept this situation, but conflicts do erupt in some areas over the division of competences between the states and the federation. The development of transmission networks is a case in point. While network planning is in the remit of the federal government, it directly affects those federal states whose administrations are responsible for approving the specific routes of transmission lines. The federal government bears most of the brunt caused by delays in studies and assessments being issued since they slow down the implementation of the *Energiewende*). They do also affect those German federal states which rely on energy imports from other regions of Germany, though.

[42] Unlike, e.g. education, which is in the exclusive remit of the federal states.

[43] See for example the energy policy guidelines of Mecklenburg-Vorpommern "Energieland 2020" http://www.regierung-mv.de/cms2/Regierungsportal_prod/Regierungsportal/de/vm/Themen/Energie/Leitlinien_Energieland_2020/index.jsp

4. State ministries in charge of energy

Federal states	Government	Ministry
Baden-Württemberg	Greens/SPD	Ministry of the Environment, Climate Protection and the Energy Sector
Bavaria	CSU/FDP	Ministry of Economy, Infrastructure, Transport and Technology
Berlin	SPD/CDU	Ministry of Economy, Technology and Research
Brandenburg	SPD/The Left	Ministry of Economic and European Affairs
Bremen	SPD/Greens	Ministry of the Environment, Construction and Transport
Lower Saxony	CDU/FDP	Ministry of the Environment, Energy and Climate Protection
Hamburg	SPD	Ministry of Economy, Transport and Innovation
Hesse	CDU/SPD	Ministry of Environment, Energy, Agriculture and Consumer Protection
Saarland	CDU	Ministry of the Economy, Labour, Energy and Transport
Mecklenburg--Vorpommern	SPD/CDU	Ministry of Energy, Infrastructure and State Development
Rhineland-Palatinate	SPD/Greens	Ministry of Economy, Climate Protection, Energy and Spatial Planning
North Rhine-Westphalia	SPD/Greens	Ministry of Economy, Energy, Industry, Medium-Sized Business and Trade
Saxony	CDU/FDP	Ministry of Economy, Labour and Transport

Federal states	Government	Ministry
Saxony-Anhalt	CDU/SPD	Ministry of Research and Economy
Schleswig-Holstein	CDU/FDP	Ministry of Energy, Agriculture, the Environment and Rural Areas
Thuringia	CDU/SPD	Ministry of Economy, Labour and Technology

The *Energiewende* does, though, involve some of the state's competences being moved to the central administration. The Federal Network Agency is a case in point: it has been in charge of overseeing the development of transmission networks since the launch of the *Energiewende*. This solution infringes the principle that the federal states should make decisions on energy policy measures which affect their territories. It gave rise to long debates and provoked resistance from some federal states during work on the laws on the *Energiewende*[44]. Co-ordinating the different energy concepts of individual federal states, which often differ dramatically, is one of the main challenges of the *Energiewende*.

[44] See for example: Länder und Bund ringen um Netz-Hoheit, *Handelsblatt,* 15.04.2011, http://www.handelsblatt.com/politik/deutschland/energiepolitik-laender-und-bund-ringen-um-netz-hoheit/4064196.html

III. ECONOMIC BACKGROUND AND THE SITUATION IN THE ENERGY SECTOR

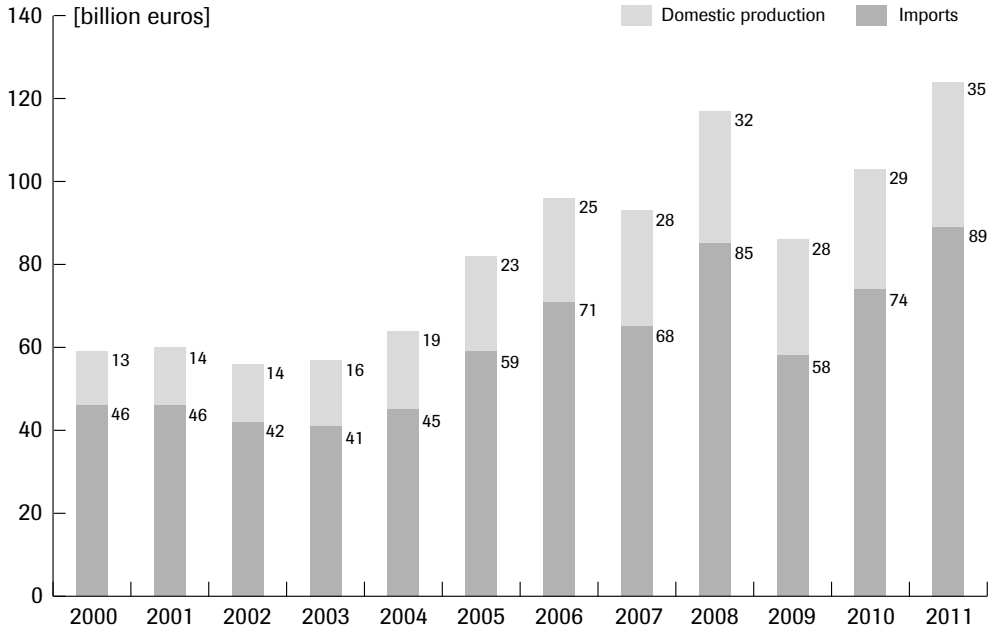
1. The main economic assumptions of the *Energiewende*

Due to the fact that it was announced at short notice and with a very tight implementation schedule, the *Energiewende* had to be in line with the objectives of Germany's existing climate and energy policy.

There has been debate underway for several years on the falling levels of reserves of conventional energy and the consequences of the German economy's dependence on foreign imports of energy resources. One of the main considerations behind the adoption of the *Energiewende* was to limit Germany's dependence on energy imports and its susceptibility to energy price fluctuations. The government had adopted a strategy to increase the share of renewable energies in Germany's energy mix already on 28 September 2010, its main objectives were:

- to limit climate-damaging greenhouse gas emissions by 40% below 1990 levels to 2020, by 55% to 2030, by 70% to 2040 and by 80–95% to 2050;
- to lower primary energy consumption by 20% to 2020 and by 50% to 2050;
- to increase energy productivity with respect to final energy consumption by 2.1% a year;
- to reduce electricity consumption below 2008 levels by 10% to 2020 and by 25% to 2050;
- to reduce demand for heat for buildings by 20% to 2020, and demand for energy by 80% to 2050;
- to ensure that renewable energies account for at least 18% of final energy consumption by 2020, 30% by 2030, 45% by 2040 and 60% by 2050.

Figure 1. Production and distribution cost of primary energy produced in Germany and imported



Source: http://www.bmwi.de/Dateien/BMWi/PDF/energiewende-in-deutschland,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf, p. 10

As nuclear power plants are to be phased out earlier than had originally been planned, certain processes, which originally were expected to be spread out over longer periods, have to be accelerated. This objective is to be achieved through the faster development of renewable energy, as well as the extension of gas- and coal-fired power plants which are supposed to replace the nuclear power plants in the medium term before renewable energy generation fills the gap left by nuclear energy. The obligation to increase the share of renewable energy in Germany's energy mix is now laid out in laws. The government's new strategy emphasises the need to ensure cost-effectiveness, with a view to protecting the interests of companies in energy-intensive industries, for which energy price spikes could spell bankruptcy. The development of wind energy is the cornerstone of the strategy, with wind power expected to cater for 50% of Germany's demand for electricity by 2050.

The second main element of the new strategy concerns bringing work on the development of energy transmission networks forward. Highly industrialised southern Germany is most susceptible to disruptions in the energy supply as a result of the phasing out of nuclear power plants (hence the dynamic growth in electricity imports from France after some of the nuclear power plants were shut

down), but the largest wind farms capable of satisfying the needs of industrialised areas are located in the north. Thus, connecting the two regions of Germany by a high-capacity network has become a priority, along with research into new ways of storing energy. A debate is still ongoing on whether the government is right to be developing offshore wind farms in a situation where the technology of building such installations is yet to be tested in practice. Moreover, locating the wind farms in the north generates higher costs of investments into transmission networks than would be incurred should they be constructed directly in the federal states that need most power. On the other hand, the government is concerned that electricity generation in wind farms inland would be less stable than offshore. Furthermore, the offshore wind farms are regarded as a sort of recompense for the energy companies which – in the decentralised model of energy generation – can count on no other large-scale investments.

In the short term, the gap in energy supplies caused by shutting down nuclear power plants is to be filled by conventional energy from gas- and coal-fired plants already under construction; according to the government's estimates, the capacity of conventional power plants has to be extended by a further 10 GW. The development of adequate smart transmission networks capable of co-ordinating the supply and demand of energy also plays a very important role in the new strategy. The output of unconventional power plants is typically subject to wide fluctuations between different times of the day and between seasons and these may lead to disruptions in the electricity supply. Therefore, unconventional plants have to be supported by conventional power plants (providing back-up capacity) and energy storage facilities.

On 28 March 2012 the federal Ministry of Economy and the federal Ministry of the Environment jointly presented a ten-point action plan for the *Energiewende*, which also identified the most important problems impeding the transformation. The two most important issues identified by the ministries concerned better regulation for the development of wind farms, and enhancing the capacity of transmission networks to meet the needs of the *Energiewende*[45]. The document also noted the need to create legislative mechanisms to revoke licences for the use of the most attractive wind farm sites if the investors holding such licences fail to carry out their investments in a timely fashion. Both ministries also emphasised the need to launch a support programme for the construction of ten offshore wind farms as soon as possible. The implementation of those projects

[45] http://www.bmu.de/files/pdfs/allgemein/application/pdf/10-punkte-sofortprogramm_bericht_bf.pdf

would offer an opportunity to gather experience that will be useful for the contractors and operators working on successive projects. According to the authors of the plan, an adequate forum has been put in place to enable effective dialogue over efficient grid development and to kick-start work aimed at preparing legal bases for the construction of transmission lines connecting the wind farms in the North Sea and the Baltic. Another important element of the plan concerns exempting hydroelectricity power plants which store energy from transmission charges. Finally, the two ministries noted that transmission network operators still had no specific plans in place for network development.

A report published by the federal Ministry of the Environment in June 2012 is another document that describes the progress made over the preceding year[46]. Its authors note that before June 2012, 24 transmission network projects were implemented, as a result of which 214 km of new transmission lines were built (out of the 3,800 km that need to be built by 2020). Moreover, the report observed the need to accelerate the process of connecting the offshore wind farms to the grid, which is expected to provide a boost in their development. The report also states that Germany has started co-operation with Norway, Austria and Switzerland with a view to the extension of those countries' pumped--storage hydroelectricity power plants to store power surpluses in the future.

As the report concluded that it was necessary to ratchet up the rate of development of offshore wind farms, it was followed by a joint presentation by the ministers for the environment and economy of a draft law facilitating investments in offshore wind farms. One of the measures provided for by the law consists in indemnities for investors if there are delays in connecting their wind farms to the grid.

2. Importance of conventional energy resources for the German economy

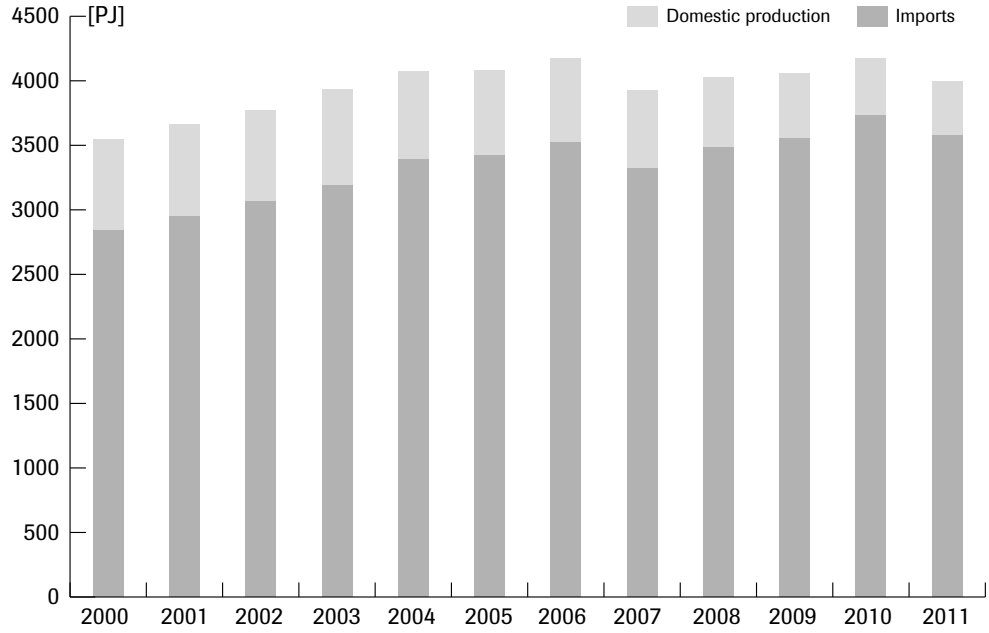
Most energy in Germany is derived from conventional energy resources which are mostly imported from abroad.

Oil accounts for the largest share (34%) in Germany's primary energy consumption because it represents a large proportion of fuel consumption in transport. Oil imports are being reduced by biofuel production in Germany. The government expects the role of oil to diminish in the future due to a more extensive use of gas and the development of electromobility.

[46] http://www.bmu.de/files/pdfs/allgemein/application/pdf/broschuere_energiewende_weg_bf.pdf

Natural gas is one of the most important sources of primary energy in Germany. In 2011 it accounted for 21.9% of the country's primary energy consumption. With such a high position of gas in its energy mix, Germany was the second largest consumer of gas in the EU after the United Kingdom, and accounted for 16.5% of total gas consumption in the European Union[47]. Domestic resources cover around 10% of Germany's demand for gas, and this proportion is falling. The *Energiewende* will increase Germany's dependence on gas imports from abroad. However, the German government hopes that this adverse trend will be mitigated by increased energy generation from biomass and an increased production of biogas. According to some analyses, biogas could replace as much as 10 billion m^3 of natural gas by 2030[48].

Figure 2. Domestic and imported gas consumption in Germany



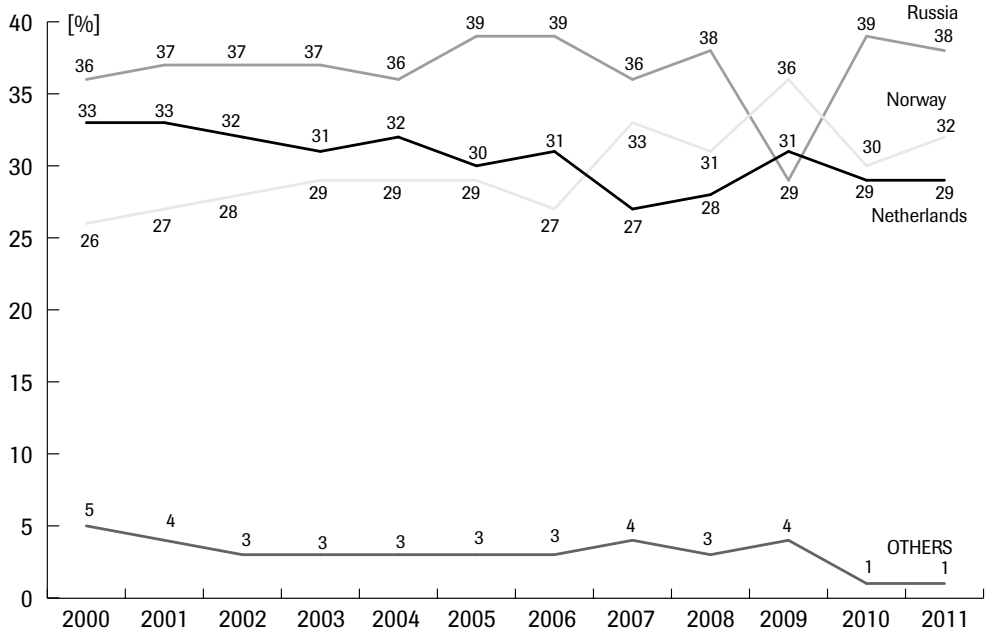
Source: Federal Office for Economics and Export Control (BAFA)

Figure 2 shows that, while gas consumption in Germany has stabilised in recent years at around 4 thousand PJ (petajoules), this did not stop the upward trend in gas imports. The reason for this was that domestic gas extraction has in recent years fallen to half its previous level.

[47] http://www.bmwi.de/DE/Themen/Energie/Energietraeger/gas.html

[48] http://www.bmwi.de/DE/Themen/Energie/Energietraeger/gas,did=292326.html

Figure 3. Source countries of Germany's gas imports



Source: Federal Office for Economics and Export Control (BAFA)

Figure 3 shows that the structure of imports has undergone no major changes and retains a good level of diversification. Russia remained the largest gas supplier to Germany over the last decade, with the exception of the year 2009 when the German economy experienced the largest recession since the war and its GDP fell by 5%. Russia's share in imports has increased by 2 percentage points since the beginning of the decade. Imports from Norway increased even more, by 6 percentage points between 2000 and 2011. Meanwhile the share of the Netherlands and the remaining importers has decreased. Despite the country's strong dependence on gas imports from abroad, Germany considers its gas supplies to be secure in the longer term. This conviction stems from the fact that both the set of suppliers and the gas import infrastructure are well diversified. Gas from Norway is transmitted *via* three separate gas pipelines with a total capacity of 54 billion m^3. The infrastructure for gas supplies from Russia is similarly diversified: Russian gas reaches Germany *via* pipelines in Poland (Yamal), Ukraine (Transgas) and directly *via* the Baltic Sea (Nord Stream). The prospects of the Nabucco gas pipeline, which could diminish Russia's share in Germany's gas imports, are unclear at this stage. Germany also considers its practice of concluding long-term supplies contracts as a way of making gas supplies secure. Finally, gas storage facilities also improve the security of gas supplies. Currently there are 47 gas depots in Germany, with a capacity of 20 billion m^3 of gas. This is estimated to cover

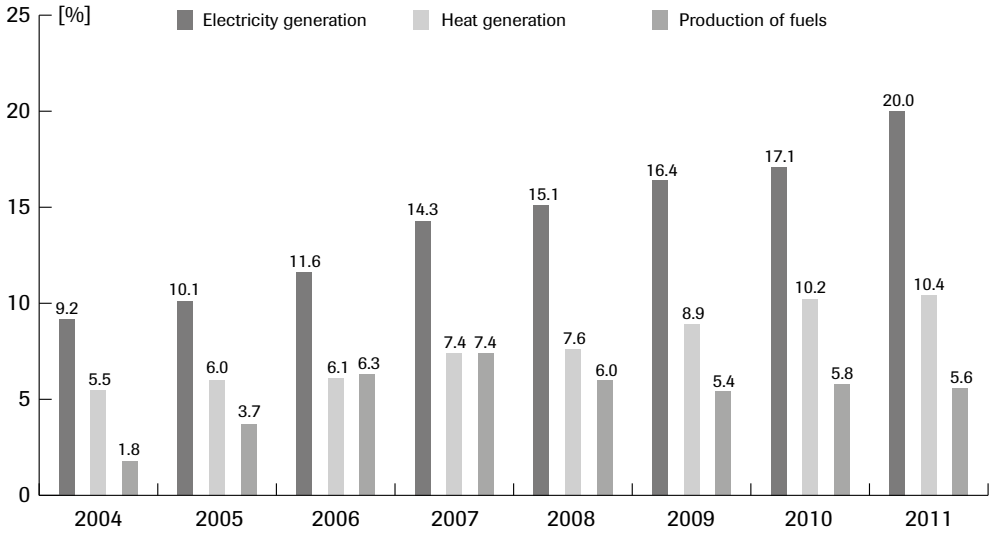
the country's needs for 80 days. Work is in progress to increase the existing storage capacity by 20%[49].

Coal is still important for the German economy. Bituminous coal and lignite account, respectively, for 12.6% and 11.7% of Germany's primary energy consumption. These two resources play an even more important role in electricity generation: 43.5% of electricity is produced from coal (24.9% from lignite and 18.6% from bituminous coal)[50]. Power plants and the steel industry were the main consumers of coal in 2011 in Germany (accounting for 70% and 27%, respectively, of total consumption). Due to it being less competitive than imports, German coal is subsidised to an amount of around 1.7 billion euros per year. The European Commission has authorised a four-year extension (to 2018) of the subsidies scheme.

3. Importance of renewable energy sources for the German economy

As a result of Germany's decision to phase out nuclear energy and immediately shut down eight nuclear power plants, the importance of renewable energy sources increased dynamically. In 2011, the share of renewable energy in total electricity consumption increased to 20% against 17.1% the preceding year.

Figure 4. Share of renewable energy in final energy consumption: electricity, heat and fuel



Source: http://www.bmu.de/files/pdfs/allgemein/application/pdf/ee_in_zahlen_2011_bf.pdf, p. 16

[49] http://www.bmwi.de/DE/Themen/Energie/Energietraeger/gas,did=292330.html

[50] http://www.bmwi.de/DE/Themen/Energie/Energietraeger/kohle.html

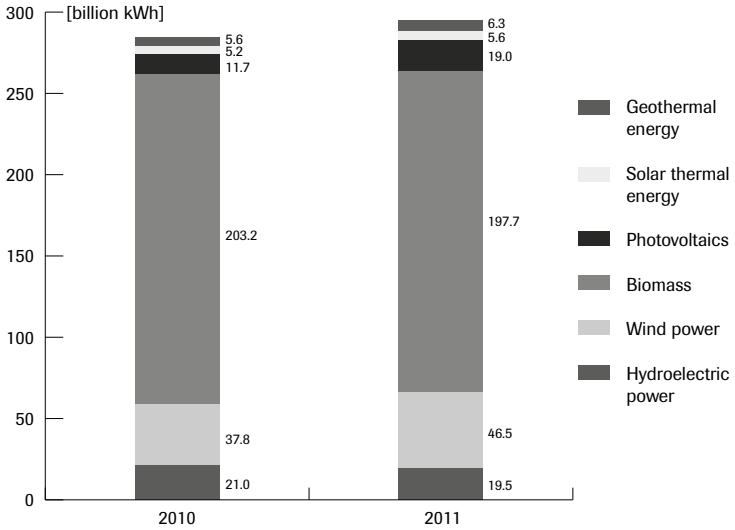
This growth was possible mainly due to the increase in power generation in wind farms and photovoltaic installations. The share renewable energy has in overall final energy consumption is nearly half that in electricity consumption where it increased from 11.3% to 12.2% in the period in question. Renewable sources of energy represent a smaller share of total energy production because they account for a much smaller proportion of heat consumption (10.4%) and fuel consumption (5.6%) than of electricity consumption (20.0%). A strong upward trend was observed in recent years as regards the role of green technologies in electricity generation, which had been growing steadily since 2004. The share of green technologies in heat generation has been subject to greater fluctuations, but it has also been growing faster since 2007. In the case of fuel production, on the other hand, the significance of renewable energies is low and their share has again fallen after having risen in 2004–2007.

Table 1. Main indices of renewable energy consumption in Germany

	2010	**2011**	**Change**
Share of renewable energy in total electricity consumption	17.1%	20.0%	+17.0%
Final energy from renewable energy sources	104 billion kWh	122 billion kWh	+17.3%
Share of renewable energy in final heat consumption	10.2%	10.4%	+2.0%
Share of renewable energy in fuel consumption	5.8%	5.6%	-3.4%
Share of renewable energy in final energy consumption	11.3%	12.2%	+8.0%
Share of renewable energy in primary energy consumption	9.7%	10.9%	+12.4%
Total final energy from renewable sources	284 billion KWh	295 billion kWh	+3.8%

Source: http://www.bmu.de/files/pdfs/allgemein/application/pdf/ee_in_zahlen_2011_bf.pdf, p. 4

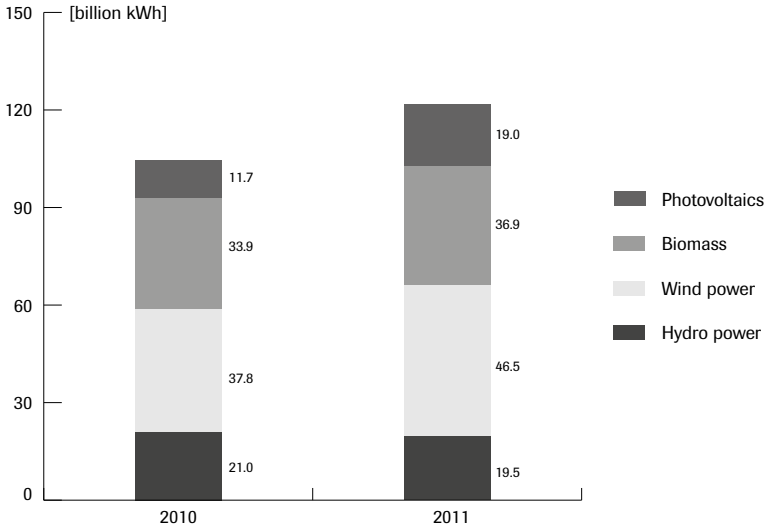
Figure 5. Germany's final energy consumption: renewable energy



Source: http://www.bmu.de/files/pdfs/allgemein/application/pdf/ee_in_zahlen_2011_bf.pdf, p. 7

A comparative analysis of the importance of different sources of unconventional energy reveals the dominant role of biomass, due to its significance in heat generation and fuel production. Geothermal energy and photovoltaics are the only other green energy sources that can also be used to generate heat. In this comparative analysis, the remaining renewable energy sources play a much smaller role than biomass, which accounts for 67.1% of total renewable energy consumption.

Figure 6. Germany's final energy consumption: renewable electricity



Source: http://www.bmu.de/files/pdfs/allgemein/application/pdf/ee_in_zahlen_2011_bf.pdf, p. 7

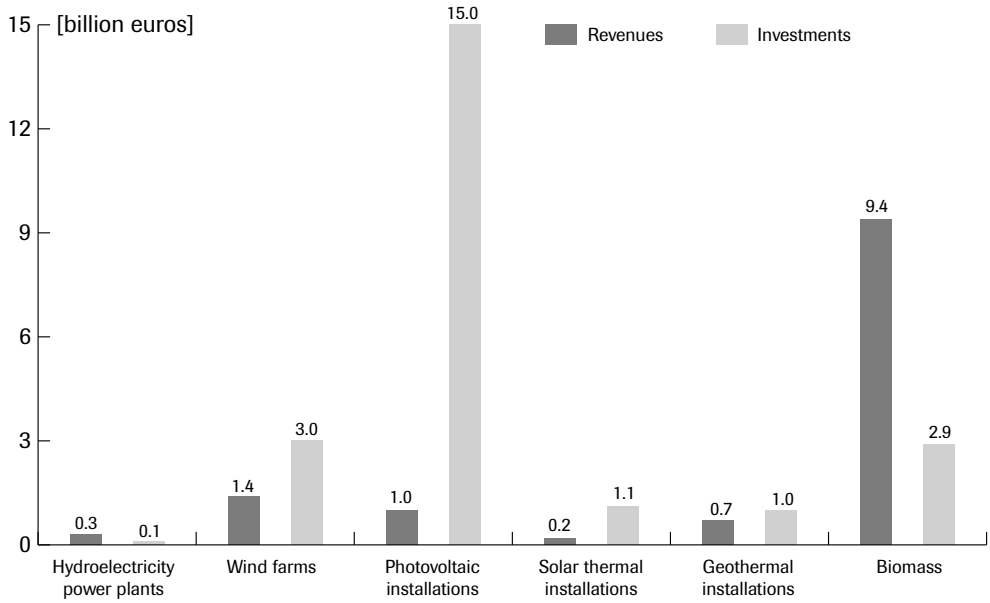
A comparative analysis of the roles of different renewable energy sources in electricity generation highlights the significance of **wind power**, which accounts for 38.2% (46.5 billion KWh) of total electricity from unconventional sources, and 15.8% of total renewable energy. Germany's output of wind-generated electricity increased by 23% in 2011, the increase being mainly due to a considerable expansion of wind farm capacity, but also unfavourable weather conditions in the preceding year, which had adversely affected wind power output in 2010. In 2011 Germany had a total of 895 wind farms with a total capacity of 2,007 MW.

Biomass is the second most important source of renewable electricity, accounting for 30.3% (36.9 billion kWh) of total electricity from renewable sources and 67.1% of all "green" energy in Germany. In 2011, a 3% decrease of biomass consumption in the total energy mix was reported, however, electricity generation from biomass increased by 8%. The significance of biomass stems primarily from its important role in heat generation. In 2011, 126.5 billion kWh of heat was produced from biomass. Biomass is also the only renewable energy source that plays an important role in fuel production, accounting for 34.3 billion kWh of energy in the form of fuels in 2011.

Solar installations accounted for 18.4% of renewable-generated electricity consumed in 2011 in Germany, which corresponds to 6.5% of total "green" energy. Germany's solar installations market is the fastest-developing market segment in Germany today – the total capacity of photovoltaic installations increased by 62.4% in 2011 against 2010, reaching 24.8 GW. If this growth rate is maintained, photovoltaic electricity output may soon surpass the output of wind power.

Hydroelectricity power plants are another important source of renewable electricity, generating 14.6% of renewable energy consumed in Germany. Their output in 2011, however, was 8% lower than in the previous year due to adverse weather conditions, despite the fact that available capacity increased as a result of the extension of a hydroelectricity power plant on the Rhine. Finally, **geothermal power plants**, which mostly generate heat, accounted for 2.1% of renewable energy consumption in Germany.

Figure 7. Revenues from, and investments into, different sectors of the renewable energy industry in 2011

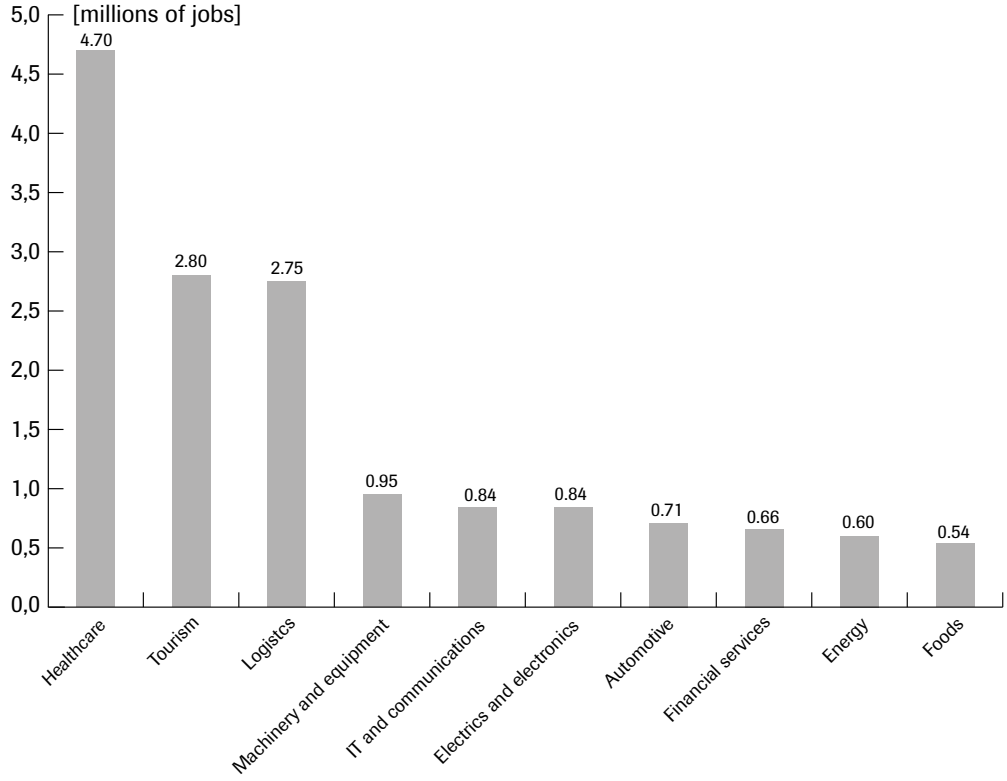


Source: http://www.bmu.de/files/pdfs/allgemein/application/pdf/ee_in_zahlen_2011_bf.pdf, p. 19

The above comparison of investments into, and revenues from, the different sectors of the renewable energy industry demonstrates the scale of spending on renewable energy, even while revenues from those investments are much lower than the funds invested. In 2011, only the biomass and hydroelectric power sectors reported revenues higher than investments. The reason was that investments in the two sectors were lower in recent years since they had been more heavily invested into in the period before the *Energiewende*, and their profitability is higher than that of the other renewable energy sources. In the other sectors, especially in photovoltaic installations and wind farms, spending significantly exceeded revenues because of the huge scale of investments into these two sectors. Moreover, in the case of photovoltaic installations, part of the explanation may be the fact that they are often used by households which use the energy they produce for their own needs.

Renewable energy is an important sector of the German economy, but it is not yet a key sector. According to the federal Ministry of the Environment, the renewable energy industry employed 382,000 people in 2011, which represents an increase of 129% over the last eight years. The total turnover of companies in this sector reached 24.9 billion euros in 2011 (including exports).

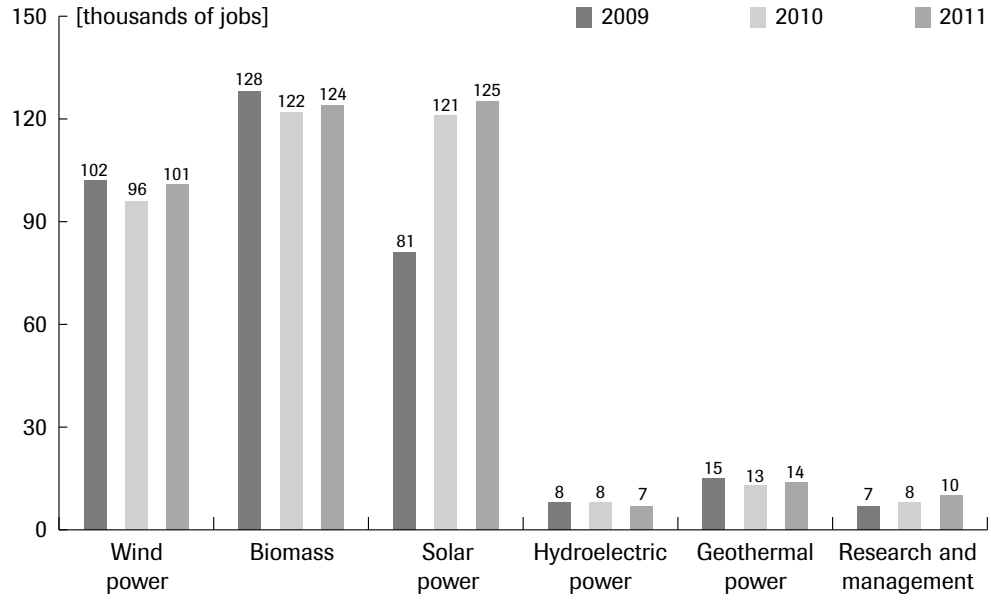
Figure 8. Employment in the most important industries in Germany in 2011



Source: Federal Ministry of Economy and http://wirtschaft.t-online.de/das-sind-die-groessten-branchen-in-deutschland/id_50517572/index

The above comparison of employment figures between energy and other sectors shows that the energy industry ranks among the ten most important in the economy. The entire energy industry employed around 600,000 people in 2009, of which around 39% were employed in the conventional energy sector. The number of jobs in the unconventional energy sector is not very high in comparison with the largest sectors of the economy, but its growth dynamics suggests that in future it may become an important arm of the German economy. Among the ca. 333,000 people employed in the renewable energy industry, around 62% are employed in equipment manufacturing, 20% in service and maintenance, and 17% in distribution. The Ministry of the Environment estimates that employment in this sector will increase to 500,000–600,000 by 2030. However, this growth will be accompanied by falling employment in companies dealing with conventional energy, so it is difficult to say whether it will really contribute to an increase in the overall number of jobs.

Figure 9. Employment in the renewable energy industry by sector



Source: Federal Ministry of the Environment

An analysis of employment figures in the different sectors of the renewable energy industry shows that wind power, solar power and biomass account for a significant majority of jobs in the industry. In most sectors of the renewables industry, employment has been rather stable in recent years. Solar power is an exception, reporting faster growth in employment due to state subsidies for the installation of solar collectors. However, the number of jobs in this area is unlikely to continue to grow at a similar rate in the future because competition from China is becoming stronger, and the subsidies for solar installations have recently been reduced, which led to bankruptcy for many manufacturers in 2011.

Renewable energy technologies are one of the fastest growing branches of German exports, but it is difficult to accurately assess the rate of this growth as no up-to-date figures on growth dynamics are available. In 2007, Germany exported nearly 9 billion euros worth of renewable electricity installations. The sale of wind farm components accounts for 85% of this revenue. Germany hopes that exports of this technology in particular may become a German speciality due to the country's traditionally strong competitive advantage in the machine-building industry. Europe was the destination for 45% of the exports, while Asia accounted for 26%, and the US for 25%[51]. According to the German

[51] http://www.unendlich-viel-energie.de/de/wirtschaft/detailansicht/browse/1/article/188/exportmaerkte-fuer-erneuerbare-energien-aus-deutschland.html

Institute for Economic Research, green technology exports accounted for 1.9% of Germany's total exports of industrial products in 2010[52].

4. Financing the *Energiewende*

Various forms of government support for the deployment of renewable energy installations, administered by various ministries, existed even before the German government decided to phase out nuclear energy. Germany had stepped up financing for renewable energy sources already in 2010, before the Fukushima nuclear disaster, by increasing the renewable energy surcharge on electricity bills. Moreover, the Energy and Climate Fund was established in 2010, with the tax on nuclear power plants as its main source of financing. It took over ongoing energy projects from various ministries, in order to provide those projects with a stable source of financing. In this context, the *Energiewende* simply entailed a continuation of plans to increase the surcharge on electricity bills, which dated back to 2010, and a decision that the Energy and Climate Fund should receive more funding from the sale of carbon credits. From the financial point of view, then, one could say that the Fukushima disaster was used to lend a new political impulse to old ideas, but without assigning any major new pools of financing from the federal budget. It was also useful in justifying the sacrifices that the public was expected to make by paying ever higher electricity bills that were growing mainly due to the renewable energy subsidies. This has been particularly painful in the context of the financial crisis. Finally, the *Energiewende* also provided a justification for increasing the budget of the federal Ministry of the Environment in 2012–2013, which had been cut the two previous years. This, however, does not change the fact that even with the 13% increase, this ministry's budget for 2009--2013 is not significantly larger than the budgets of other ministries[53].

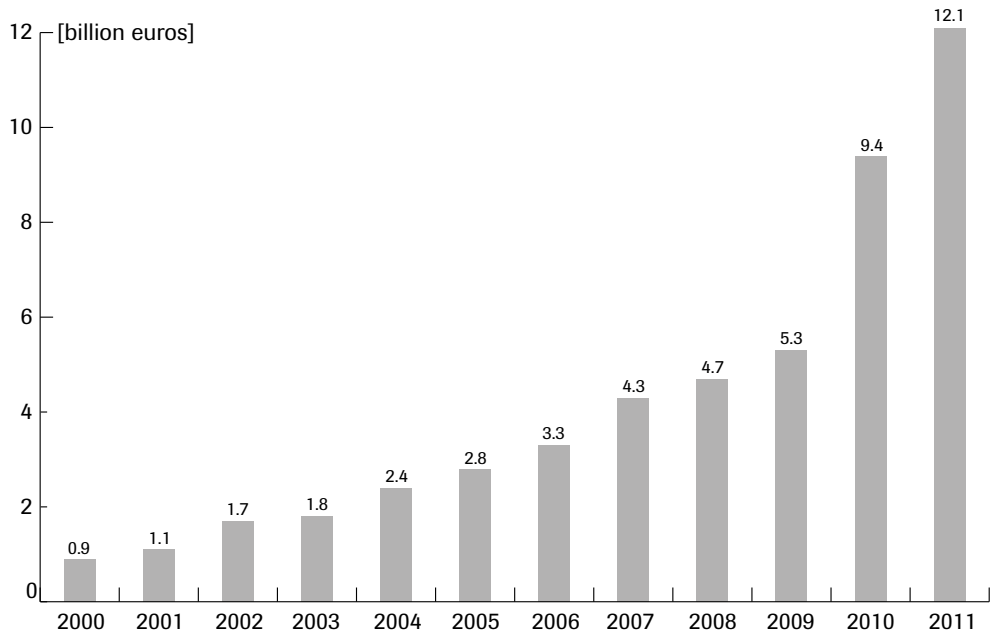
The largest share of the burden of renewable energy subsidies is borne directly by individual energy consumers and those companies which have not been exempted from surcharges for the financing of renewable energy development. In 2000 the German government (then the SPD and the Greens) introduced electricity bill surcharges (EEG-Umlagen) to support companies producing energy from unconventional sources (which were less competitive than conventional energy sources). The surcharge meant that the prices of electricity increased by 20% over the base price. Particularly energy-intensive businesses

[52] http://www.diw.de/documents/publikationen/73/diw_01.c.388573.de/11-45-4.pdf, p. 4.

[53] http://www.bundesfinanzministerium.de/Content/DE/Pressemitteilungen/Finanzpolitik/2012/03/2012-03-21-PM10anl2.pdf?__blob=publicationFile&v=4, p. 9.

were made eligible for exemption from the surcharge. In 2011, this exemption applied to around 600 German companies employing around 1 million people, which were entitled to tax breaks worth a total of around 2.2 billion euros. Some of them are also eligible for exemptions from the electricity transmission charge. The government is expected to take further exemptions into consideration, in particular for small and medium-sized entities (SMEs)[54]. Apart from the renewable energy surcharges, a co-generation surcharge (KWK-Umlage) is also in place to support combined generation of heat and electricity in order to increase the efficiency of energy production. However, energy-intensive companies are eligible for a partial exemption from the surcharge, and its maximum rate is 0.05 cents per 1 KWh. The exemptions from the surcharges cost the remaining electricity consumers and the non-privileged companies (90% of companies) 700 million euros a year and added an additional approx. 18 euros to the average household's fuel bill in 2011[55].

Figure 10. Total amount of electricity bill surcharges collected from non--privileged electricity consumers



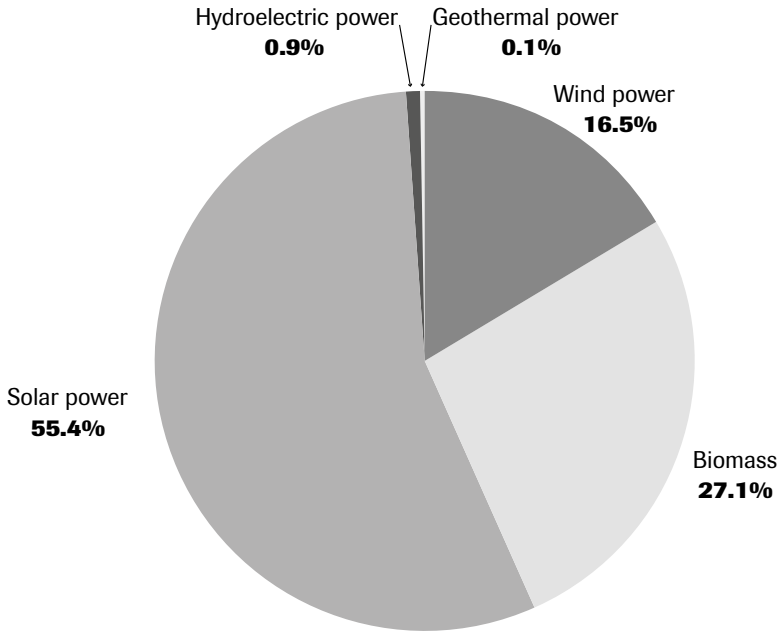
Source: http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/broschuere_ee_zahlen_bf.pdf, p. 42

[54] http://www.bmwi.de/BMWi/Redaktion/PDF/Publikationen/jahreswirtschaftsbericht-2012,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf, p. 55.

[55] http://www.unendlich-viel-energie.de/uploads/media/48_Renews_Spezial_Industriechancen.pdf

The electricity bill surcharge is intended to cover losses that distributors could suffer from trading renewable electricity in the markets. The surcharges have grown systematically since 2000, with dramatic increases of 77.4% and 28.7% respectively in the years 2010–2011.

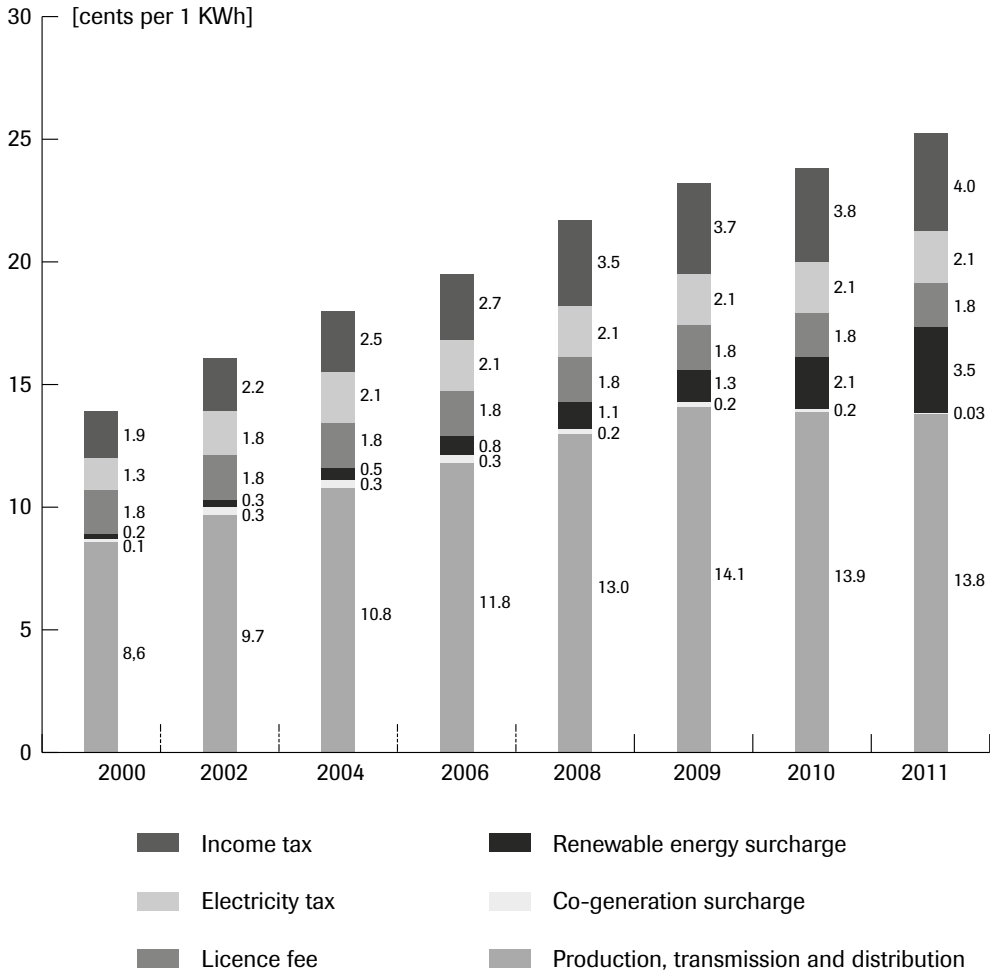
Figure 11. Distribution of subsidies financed from electricity bill surcharges in 2011



Source: Federal Ministry of the Environment

It is interesting to see how the surcharge revenue is distributed among the different sources of renewable energy. In 2011 55.4% of the funds was transferred to the producers of solar power, followed by owners of biomass installations who accounted for 27.1% of the total. Producers of wind power were the third and last sector to receive a significant amount of funds, accounting for 16.5% of the total. Compared to 2009, before the decision to shut down some nuclear power plants, subsidies grew fastest for wind power (by 174%), photovoltaic power (by 152%) and hydroelectric power (by 144%), although the amounts of subsidies for all these sources of energy were subject to large fluctuations because of considerable variations in the amounts of energy produced. However, the trends are not fully in line with the government's assumptions, since a major portion of surcharge revenue goes to the solar power sector while it is wind power that is crucial for the implementation of the *Energiewende*.

Figure 12. Components of household electricity bills in Germany

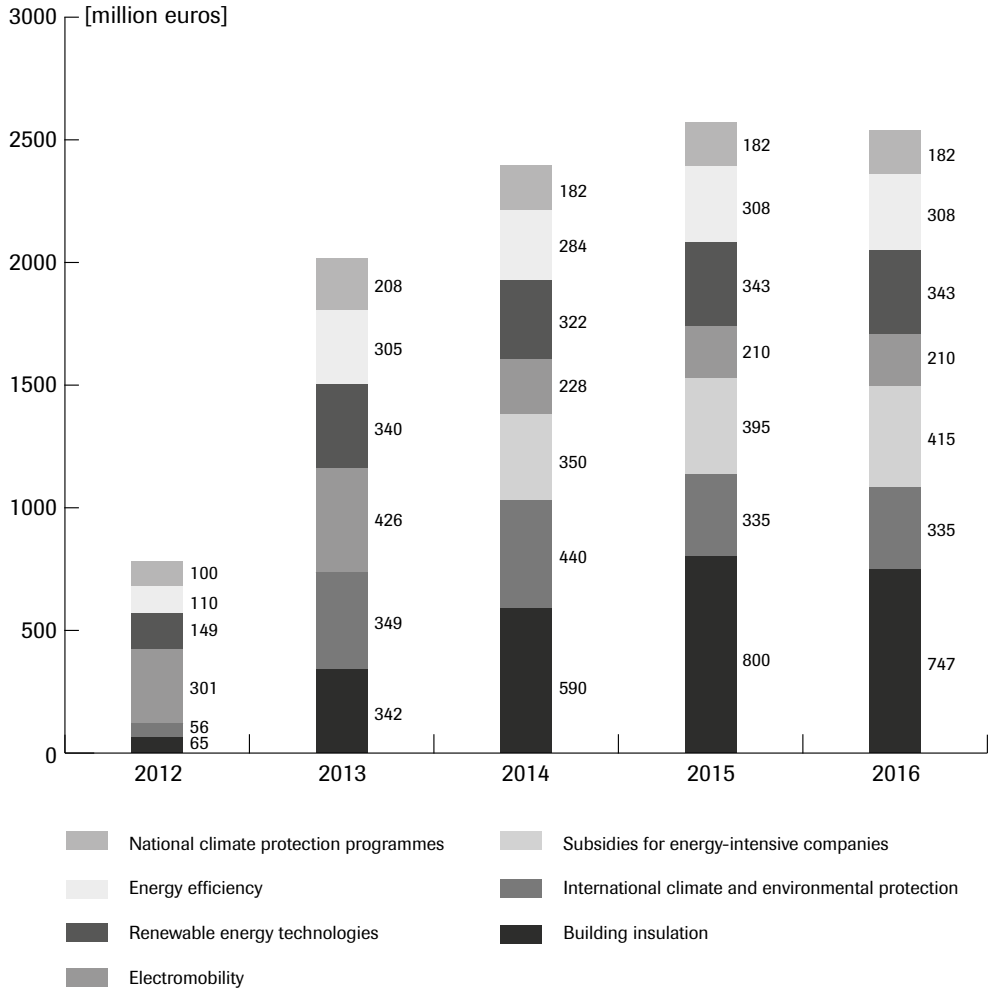


Source: http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/broschuere_ee_zahlen_bf.pdf, p. 43

The renewable energy surcharge has been the fastest-growing component of electricity bills in Germany. In 2011, the surcharge was 3.53 cents per 1 KWh, with the price of 1 KWh of electricity at 25.2 cents on average. This means the surcharge made up 13.9% of the price of 1 KWh of electricity, against only 5.1% in 2008.

The expanded budget of the Energy and Climate Fund, which now receives the total revenue from Germany's additional CO_2 emissions allowances, was supposed to be the most important new financial resource of the *Energiewende*. The increase was intended to make up for the funding gap created by a decrease in revenue from the tax on nuclear power plants after some of the plants were shut down.

Figure 13. Distribution of financing from the Energy and Climate Fund under the amended 2012 budget



Source: http://www.bundesfinanzministerium.de/Content/DE/Pressemitteilungen/Finanzpolitik/2012/03/2012-03-21-PM10anl2.pdf?__blob=publicationFile&v=4, p. 15

Along with the new resources, the fund has taken over tasks that were previously being implemented by different ministries, i.e. it will continue programmes previously financed from the budgets of individual ministries. The programme for the thermal insulation of buildings, launched in 2005, may serve as an example. Germany has also been taking action for climate protection at the international level and for the development of renewable technologies for several years. Since 2009, the country has been supporting electromobility through stimulus packages. Moreover, it should be noted that even before the *Energiewende*, revenue from the sale of CO_2 emissions allowances was earmarked for climate protection purposes within the budget of the federal Ministry of the Environment. In 2008,

932 million euros was spent on climate protection, followed by 900 million euros in 2009[56]. The Ministry of Infrastructure has an ongoing programme to support the insulation of houses and flats, aimed at reducing CO_2 emissions. It spent 7.4 billion euros on this in the years 2006–2011.

Some of the money from the Energy and Climate Fund is used to finance other actions. A governmental reply to a question from the Green party in 2011 revealed that the government intends to use up to 5% of the Fund's resources in 2013–2016 to finance the extension of effective conventional power plants[57].

In 2012, the press reported on the Fund's difficulties in raising the projected amount of funding due to the fact that market prices of CO_2 emissions allowances were much lower than expected. For instance, in February the price was 7.5 euros, compared to the projected 17 euros[58]. As a result, the government was forced to allocate the total revenue from the sale of CO_2 emissions allowances to the Energy and Climate Fund during the June amendment of the budget. Many representatives of business believe that even that will not suffice to ensure the fund raises the projected revenue[59]. This would corroborate the projections of the 2013–2016 Financial Plan, in which the fund's was downsized by 28% from 9.8 billion euros to 7.1 billion euros in 2013–2015[60] and, consequently, its spending on all categories of action was cut. This decrease in financing shows that the original plans concerning spending on the *Energiewende* have proved to have been overly optimistic, and that effective budget consolidation is more important for the government.

Apart from the Energy and Climate Fund, the implementation of the *Energiewende* will be financed mainly from the environmental protection budgets of the three ministries involved. Most of this funding has been allocated for programmes adopted earlier, whose implementation began even before the *Energiewende* was announced. The federal Ministry of Environment had a budget

56 http://www.bundesfinanzministerium.de/Content/DE/Pressemitteilungen/Finanzpolitik/2009/2009-12-16-PM58.html

57 http://www.sueddeutsche.de/wirtschaft/kohlekraft-subventionen-aus-klimafonds-regierung-will-dreckschleudern-aus-klimafonds-subventionieren-1.1119626

58 http://www.spiegel.de/politik/deutschland/energiewende-merkels-klimafonds-fehlt-das-geld-a-814765.html

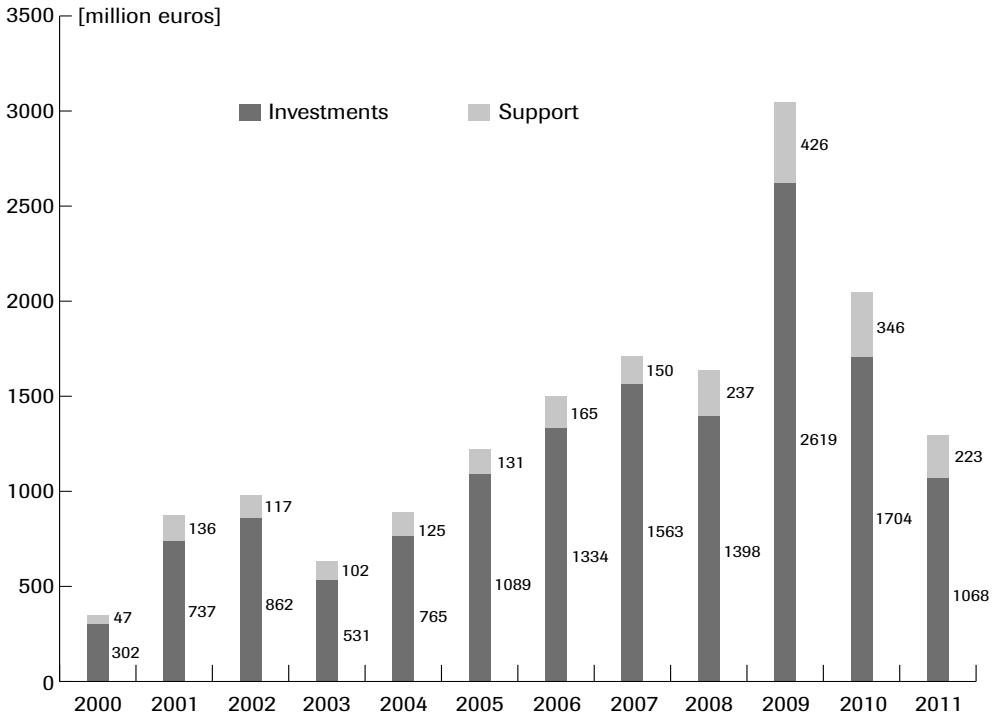
59 http://www.focus.de/politik/deutschland/energie-energiewende-wirtschaft-warnt-vor-geldmangel_aid_817083.html

60 http://www.bundesfinanzministerium.de/Content/DE/Monatsberichte/2012/07/Inhalte/Kapitel-3-Analysen/3-1-regierungsentwurf-bundeshaushalt-2013-und-Finanzplan-2016.html

of 1.6 billion euros for such programmes in 2012. This money is to be spent on a programme to promote the use of renewable energy, whose budget will be 346 million euros in 2012, 335 million euros in 2013 and 337 million euros in 2014–2015[61]. The federal Ministry of Education has been allocated 423 million euros to support energy and climate research. The Ministry of Economy has a budget of 120.9 million euros, to be spent mainly on supporting the export of renewable energy technologies and on enhancing energy efficiency.

The programme for the co-financing of offshore wind farms is a form of support created specifically for the purposes of the *Energiewende*. The government-owned bank KfW has allocated around 5 billion euros for the creation of ten offshore wind farms[62].

Figure 14. Investment support under the government programme of incentives for renewable heat generation



Source: http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/broschuere_ee_zahlen_bf.pdf, p. 49

[61] http://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Oeffentliche_Finanzen/Bundeshaushalt/beratungen-zum-bundeshaushalt-2012-im-bundestag-anlage2.pdf?__blob=publicationFile&v=3, s.34

[62] http://www.bmu.de/energiewende/beschluesse_und_massnahmen/doc/47465.php

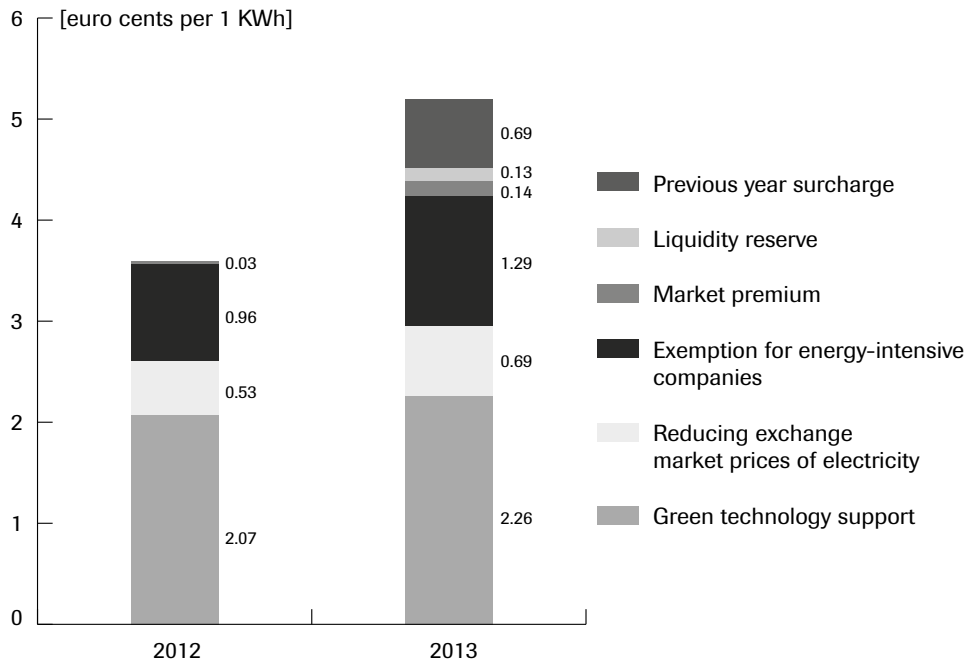
The government has been supporting the use of renewable energy in heat and power generation through its market incentive programme (*Marktanreizprogramm*). The programme also includes an instrument of subsidies for smaller installations in detached and semi-detached houses, as well as loans (that can be optionally written off) for larger heating installations, e.g. in municipalities. In practice, this support has accounted for 10–20% of investments which totalled 8.9 billion euros over the last 12 years, and has contributed to the installation of over one million solar installations and 270,000 smaller biomass installations.

5. Consequences of the faster implementation of the *Energiewende*

5.1. Rising energy prices

The significant increase in energy prices paid by households and companies is the most painful consequence of accelerating the implementation of the *Energiewende*. If the current price growth dynamics remains unchanged, the implementation of the *Energiewende* may have to be slowed down due to the budget being unable to recompense consumers for the increase in energy costs.

Figure 15. Components of the electricity bill surcharge



Source: http://www.bee-ev.de/3:1168/Meldungen/2012/EEG-Umlage-2013-Foerderbetrag-fuer-Erneuerbare-steigt-auf-2.3-Cent-pro-Kilowattstunde-Strom.html

The most rapid rise in the renewable energy surcharge was over 2010 and 2011 when it rose by 61.5% and 66.7%, respectively and it was the most important cause of electricity price increases in Germany. According to September 2012 calculations by the German Renewable Energy Federation (BEE), the surcharge will increase again in 2013 by 45% over 2012, from 3.59 to 5.21 cents per 1 KWh because all the components of electricity prices are set to increase. It is worth noting that the current structure of the surcharge favours large energy buyers at the expense of individual consumers. The excess of subsidised energy from renewable sources causes energy prices to go down in exchange markets, which is where the largest energy consumers buy electricity. As a result of this mechanism, they have access to cheaper electricity, while consumers are bearing the cost of the system's functioning.

It seems that the federal government is starting to notice the disadvantages of the current system of financing, as is evidenced by the criticism of companies investing in renewable energies and the federal state governments, spelt out by the new minister for the environment Peter Altmaier[63]. Altmaier stated directly that the current wind farm development plans risk the creation of an excess of capacity and are insufficiently co-ordinated. In his view, if they are put into practice, the 35% target of the share renewable energies in the energy mix until 2020 will be exceeded by 60%. The minister has also expressed his doubts as to the feasibility of wind power exports from the northern federal states to southern Germany because the southern federal states aim to become self-sufficient in terms of energy. This statement could be interpreted as expressing concern about a too rapid development of the renewable energy sector, which would entail dynamically rising electricity bills[64]. Some commentators interpreted Altmaier's statement as spelling out support for groups lobbying for offshore wind farms, which will generate profits for large companies but at the same time require costly investments in transmission networks.

The accelerated implementation of the *Energiewende* will at least temporarily entail higher energy costs for companies. According to estimates by German institutions and offices[65], in 2008, i.e. when the renewable energy surcharge was still only around 1.1 cents per 1 kWh, it represented around 0.1% of the total costs of German companies, with total energy spending accounting for 2% of

[63] http://www.taz.de/Laender-kritisieren-Altmaier/!101909/

[64] http://www.taz.de/Kommentar-Windenergieplaene/!101913/

[65] http://www.unendlich-viel-energie.de/uploads/media/48_Renews_Spezial_Industriechancen.pdf

costs. Increasing the surcharge to 3.53 cents per 1 kWh should not adversely affect the German economy's international competitiveness. It is therefore expected that, should the government manage to stabilise the surcharge rate, businesses will not be harmed. It is significant that energy-intensive sectors are not burdened with these costs. If, however, spending on distribution networks grows and the renewable energy sector develops too slowly, there is a risk that *Energiewende*-related burdens on companies will grow. The government hopes that those burdens may partly be offset by lower electricity prices in exchange markets and the fact that companies will need to buy fewer CO_2 emissions allowances. The *Energiewende* will also have the added advantage of lower import needs, which should stabilise energy prices.

However, it is worth noting that the prices of energy in Germany have become much less competitive in comparison with the situation in other countries. According to figures from the federal Ministry of Economy, in 2008 energy prices for industry (excluding VAT) oscillated around 10.66 cents per 1 KWh, which means that Germany ranked 9th in the European Union in terms of the price of electricity. By 2011, electricity prices for industry in Germany increased by 17% to 12.48 cents per 1 KWh and Germany moved up to 5th position. If this tendency gathers strength, it may have an adverse effect on exports, which are key for the German economy, accounting for over 50% of GDP. This may be particularly difficult for companies, considering that wages are expected to rise faster in the coming years. Employee pay has been stable in recent years, contributing to the competitiveness of German companies. In this context, Germany was accused of having contributed to the problems of the southern members of the eurozone through excessive exports. In the coming years wages are expected to rise in Germany, the first sign of this trend coming from the 4% increase in wages in the most important sectors of the economy in 2012.

Politicians are increasingly aware of the problem of rising electricity prices. In his statements in September 2012 Mr Altmaier stressed that he would look for solutions to limit the dynamic growth of electricity prices in Germany and seek a slowing down of the development of renewable energy. The EU commissioner for energy Günther Oettinger during his visit to Berlin in October 2012 also observed that the fact that energy prices were rising as a result of measures taken to combat climate change was an excessive burden on industry[66].

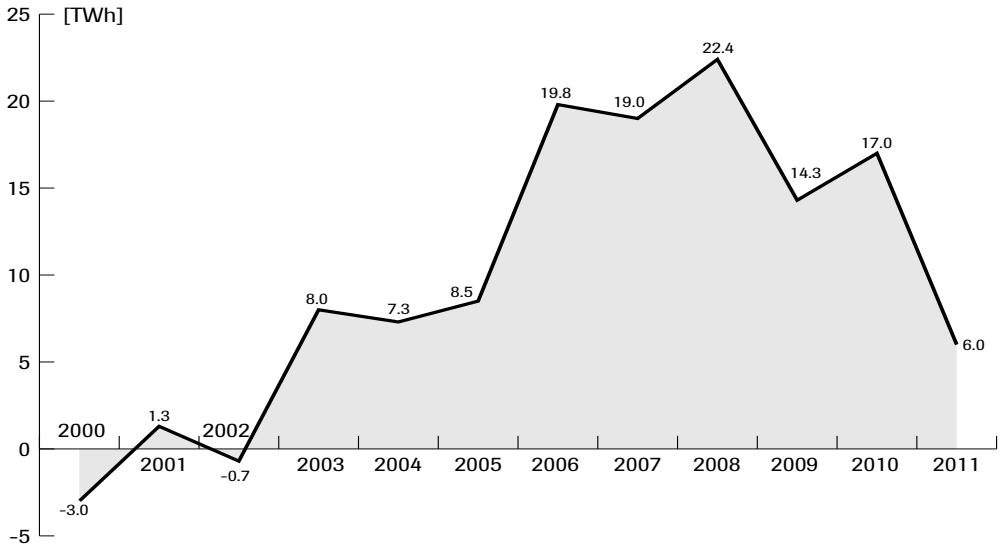
[66] A. Kwiatkowska-Drożdż, K. Popławski, Oettinger is criticising the increasing costs of the climate protection policy, CEWeekly, Issue 33(171), http://www.osw.waw.pl/en/publikacje/ceweekly/2012-10-10/oettinger-criticising-increasing-costs-climate-protection-policy

Angela Merkel, on the other hand, has firmly announced that the subsidies for renewable energy will stay in place and suggested that a reduction of social security contrbutions could recompense consumers for the rising energy prices[67]. However, the government's room for manoeuvre in this regard is limited because of the budget savings and cuts it is obliged to make due to the debt brake rule[68], and also because it needs to be prepared to incur the higher costs of rescuing the eurozone. Until now, the budget has been benefiting from lower costs of debt servicing, but it is unclear how durable this tendency will be.

5.2. Changes in the balance of foreign electricity trade

The decision to accelerate the implementation of the *Energiewende* caused a temporary shortage of electricity in Germany which meant the country had to import electricity from its neighbours in the months that followed. It is difficult to say if Germany will be able to continue running surpluses in its foreign electricity trade in the longer term. If the country opts for the scenario of a slower implementation of the *Energiewende*, it may have to import renewable energy, or even conventional energy, from abroad.

Figure 16. Balance of Germany's foreign electricity trade



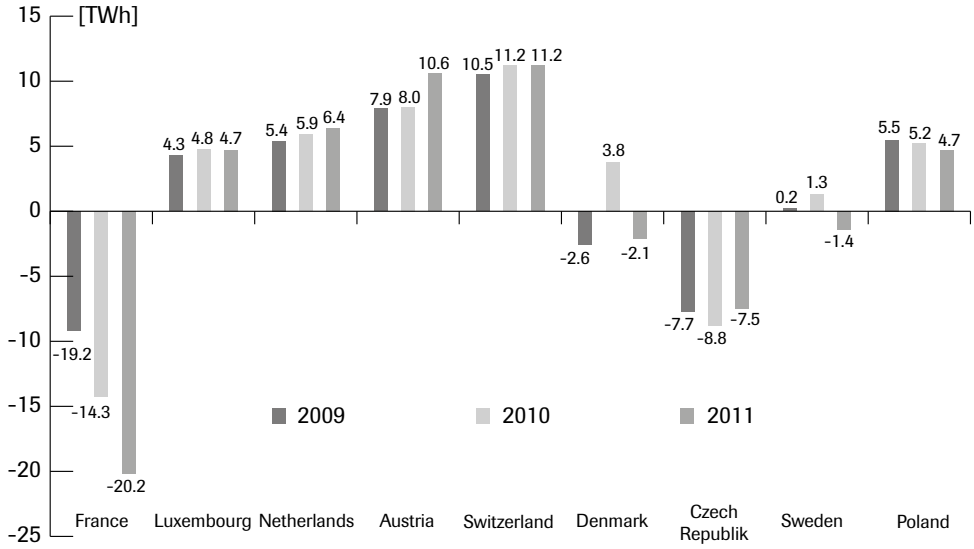
Source: Federal Ministry of Economy

[67] http://www.rheinpfalz.de/cgi-bin/cms2/cms.pl?cmd=showMsg&tpl=rhpMsg_thickbox.html&path=/rhp/welt/wirt&id=1347897206

[68] As of 2016, Germany's structural deficit (excluding one-off spending and, consequently, higher unemployment) must not exceed 0.35% of GDP.

Since 2002, Germany has systematically reported surpluses in its electricity trade with other countries. In 2011, even though a deficit was reported in the first months, the country ultimately still ran a surplus, which nevertheless dropped significantly from 17 TWh in 2010 to 6 TWh, i.e. by 65%, meaning that the value of the surplus dropped from 1 billion euros to 0.37 billion euros in 2011[69].

Figure 17. Balance of Germany's electricity trade with selected countries



Source: Report: Energieverbrauch in Deutschland im Jahr 2011, AG Energienbilanzen, p. 28

An analysis of the balance of electricity trade with different countries shows that the energy shortage was mainly filled by French, Swedish and Danish power plants. The dynamic growth of electricity imports from France is notable; in 2011 it increased by 120% over 2009 levels. However, this dynamic upward trend in electricity imports from France is expected to subside. Figures for the first half of 2012 seem to confirm this: they show that imports from France have decreased by 38%. In the same period imports from Sweden and Denmark have grown considerably by 443% and 186%, respectively[70]. Germany ultimately reported an export surplus of 10 TWh in the period in question.

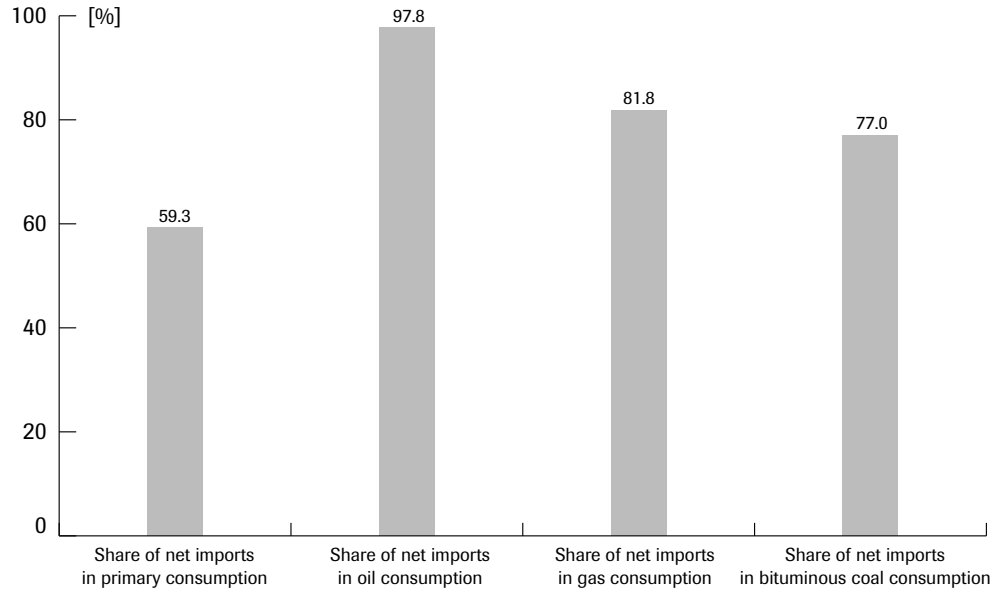
[69] Federal Statistical Office of Germany.

[70] Energienverbrauch in Deutschland: Daten für das 1. Halbjahr, AG Energienbilanzen, p. 23.

5.3. Changes in the imports of energy resources

A successful *Energiewende* could reduce Germany's dependence on energy resource imports, which currently ranges from 77% to 97%, depending on the type of resource. This could provide a strong boost for economic development, as some of the funds hitherto spent on imports could be invested domestically. This, in turn, could further increase Germany's foreign trade surplus, which was one of the highest in the world in 2011 at 158 billion euros.

Figure 18. Share of imports in the consumption of different energy resources



Source: Federal Ministry of Economy

On the other hand, lower imports of some energy resources could potentially increase the importance of other resources, especially gas, as a result of which Germany could end up importing more gas from Russia.

Table 2. Scenarios of conventional energy consumption to 2023; net nominal capacity (GW)

	Base year 2011	Power plants under construction / to be closed	Scenario A 2023	Scenario B 2023	Scenario C 2023
Nuclear energy	12.1	0.0/12.1	0	0	0
Lignite	20.2	2.7/5.3	19.3	17.6	17.6
Bituminous coal	26.3	8.0/8.5	31.9	25.8	25.8
Natural gas	26.6	0.9/5.7	22.8	31.9	31.9
Oil	3.8	0.0/1.1	2.7	2.7	2.7
Pumped storage	6.4	no data	10.9	10.9	10.9
Other	4.1	0.2/0.2	3.3	3.3	3.3
Total	99.3	11.8/32.9	90.9	92.2	92.2

Source: http://www.netzausbau.de/SharedDocs/Downloads/DE/Szenariorahmen/Eingereichter%20Szenariorahmen%20zum%20NEP%202013.pdf?__blob=publicationFile, p. 8

On 17 July 2012 the Federal Network Agency published its grid development scenarios for 2013–2022 along with forecasts concerning the capacity of conventional and unconventional sources of energy in Germany. The scenarios differ mainly in terms of the projected total capacity (with scenario A projecting lower energy consumption, and scenarios B and C – higher energy consumption), but all of them assume that conventional capacity will decrease by around 10%. According to Scenario A, the capacity of unconventional power plants will increase twofold, but at the same time the capacity of coal-fired power plants will also increase considerably, while the capacity of lignite-fired plants will decrease slightly, and the capacity of gas-fired plants will decrease significantly. According to scenarios B and C, the capacity of coal and lignite-fired power plants will decrease while the importance of natural gas-fired power plants will rise.

The figures on power plants to be extended and those to be shut down by 2023 are also interesting. They show that in order to implement any of the scenarios, the government will have to create conditions for the development of conventional power plants because Germany will need to make up at least 10 GW of conventional power plant capacity.

Table 3. Scenarios for the consumption of unconventional energy to 2023; net nominal capacity (GW)

	Base year 2011	Scenario A 2023	Scenario B 2023	Scenario C 2023
Offshore wind power	0.2	9.8	13.1	17.8
Inland wind power	29.1	45.9	49.5	84.5
Photovoltaics	25.1	55.1	61.1	51.8
Hydroelectric power	4.7	4.8	5.0	4.8
Biomass	5.3	7.9	8.7	7.3
Other	0.7	0.9	1.2	1.4
Total	65.1	124.1	138.7	167.6

Source: http://www.netzausbau.de/SharedDocs/Downloads/DE/Szenariorahmen/Eingereichter%20Szenariorahmen%20zum%20NEP%202013.pdf?__blob=publicationFile, p. 11

With regard to renewable energy, Scenario A foresees that the capacity of offshore wind farms will increase to fifty times its level in 2011, and the capacity of inland wind farms will rise 1.5 times, while the capacity of photovoltaic installations will double. In Scenario B the potential of all types of unconventional power plants will rise. Finally, in Scenario C the increase in the capacity of photovoltaic installations will be the lowest, while the capacity of wind farms will increase considerably.

Based on these scenarios it is possible to draw some conclusions about future trends in Germany's imports. Scenario A, which projects a moderate increase in the capacity of renewable power plants, is the only one in which the capacity of gas-fired power plants will decrease by approximately 15%. In the remaining scenarios, the capacity of gas-fired power plants will increase by around 20%. Germany should therefore be expected to step up its gas imports, unless it starts to extract gas from its own unconventional deposits, an idea which the public has so far strongly resisted. Meanwhile government documents project a stable or diminished demand for gas. Germany will also most likely increase its imports of bituminous coal and lignite, especially in

view of the cuts to lignite coal mine subsidies in 2018 (although the government may consider extending the subsidies). The scenarios project a considerable increase in the capacity of offshore wind farms, which means that investments will have to be made into transmission networks connecting the north of Germany with the southern federal states. It should, however, be noted that the capacity of the offshore wind farms is expected to correspond to 20–25% of the capacity of inland wind farms. In all scenarios the capacity of electricity storage facilities will only double. This may entail a high risk of electricity supply being disrupted, especially in Scenario C where the capacity of unconventional power plants is expected to be 70% higher than the capacity of conventional plants and the projected capacity of storage facilities will not make up this difference.

5.4. Consequences of possible delays in the implementation of the *Energiewende*

The scale of investments into transmission networks will also vary depending on the scenario. According to estimates from the Federal Network Agency, investments to 2022 will total 19–22 billion euros, excluding the costs of connecting offshore wind farms to the grid[71]. It is unclear how reliable those estimates will turn out to be, and whether the costs of investments will not start to grow should delays be encountered. Until now, electricity consumers have borne the greater part of network extension costs. It would not be reasonable to assume that the government will be able to allocate extra funds for investments, when faced with a prolonged crisis in the eurozone which may lead to stagnation in the coming decade.

The projected costs of investments in gas pipelines also vary depending on the scenario of gas consumption to 2023. According to a gas pipeline network development forecast published by operators in April 2012, the maximum scenario will require 1,840 km of gas pipelines to be re-built at a cost of 4.8 billion euros in the years 2012–2022. In the scenario with the lowest consumption, around 700 km of pipelines will have to be upgraded at a cost of around 2.2 billion euros[72]. Both scenarios project that the output of conventional gas extraction in Germany will decrease by 64% in the years 2009–2022[73].

[71] http://www.netzentwicklungsplan.de/sites/default/files/NEP_2012_2/Neue_Netze_fuer_neue_Energien_Stand_August_2012.pdf, p. 40.

[72] http://www.netzentwicklungsplan-gas.de/files/netzentwicklungsplan_gas_2012.pdf, p. 103.

[73] http://www.netzentwicklungsplan-gas.de/files/netzentwicklungsplan_gas_2012.pdf, p. 11.

The law on the development of transmission networks was adopted back in 2009 in order to speed up investments. The Federal Network Agency has been monitoring the progress of the implementation of various projects related to the development of renewable energy. Its current estimates (of July 2012) indicate that delays in the implementation of plans are mounting. Only 214 km of a planned 3,800 km of networks have been built to date, and only 35 km of new lines would have been put into operation in 2012. Of the 24 planned projects, only two have been launched, while fifteen report serious delays (between 1 and 5 years). No underground cables have as yet been installed as part of pilot projects[74].

Given those facts, the risk of interruptions in the electricity supply in Germany is growing. According to the Federal Network Agency, the average duration of power supply interruptions per user (the SAIDI index) increased in 2011 by 2.8% to 15.31 minutes[75]. This is the highest figure seen for this index in 3 years, although it is still much lower than in earlier periods. Around 206,000 power supply interruptions were reported in Germany in 2011. Many experts note that the incidence of momentary interruptions in the power supply (below 3 minutes) has increased considerably since the first nuclear power plants were shut down – interruptions of this kind are not included in statistics and their number may even be twice as large as officially stated[76]. Tennet, one of the transmission grid operators, had to make 990 interventions over 306 days in 2011, and 298 times on 161 days the year before in order to ensure the continuity of power supplies[77]. It also had to launch a back-up oil-fired power plant in Austria, for which it came in for criticism from many environmental organisations. Failure to adapt the transmission networks to decentralised electricity generation may create problems in Germany, and an accelerated development of renewable energy may lead to more power supply interruptions unless the transmission grids develop at a matching rate. An increased incidence of interruptions, in turn, would inevitably destabilise transmission grids in the neighbouring countries and lead to electricity price increases in the European market.

74 http://www.netzausbau.de/cln_1932/DE/Netzausbau/EnLAG-Monitoring/enlag-monitoring_node.html;jsessionid=E583B7AC4685032972743AE362410C86

75 http://www.bundesnetzagentur.de/cln_1912/DE/Sachgebiete/ElektrizitaetGas/Sonderthemen/SAIDIWerteStrom/SAIDIWerteStrom_node.html

76 http://www.focus.de/immobilien/energiesparen/problem-der-energiewende-offenbar-deutlich-mehr-stromausfaelle-in-deutschland_aid_827701.html

77 http://www.focus.de/immobilien/energiesparen/winter-engpass-deutschland-muss-strom-aus-oesterreich-beziehen_aid_699614.html

5.5. The risk of state interventions distorting the market

Accelerating the implementation of the *Energiewende* may lead to serious distortions in the market. The electricity generation market became increasingly competitive in the 1990s and the introduction of renewable energy subsidies may upset its functioning. The federal government relies on estimates only in setting the energy transformation targets, and the deadlines for successive stages of the *Energiewende* create pressure to achieve success quickly. This creates a temptation to excessively subsidise the development of renewable energy.

The photovoltaic sector is a good example of this kind of error: the co-financing it received resulted in the sector developing too dynamically at a rate that far exceeded the government's projections. As a result, the renewable energy surcharges on electricity bills increased rapidly. This led to the federal government cutting the subsidies in the first half of 2012, but it had to settle for a lower scale of cuts due to opposition from the Bundesrat. Under the draft new law, the cap on subsidies was to be lowered to 19.5 cents/KWh (i.e. by 20.2%) for small installations of up to 10 kW and to 13.5 cents/KWh (by 29%) for large installations. As the Bundesrat threatened to veto the draft, the government had to accept less far-reaching cuts and a provision that subsidies for solar installations will be phased out only after total capacity reaches 52,000 MW instead of the 28,000 MW envisaged in the original draft[78]. The changes were motivated by the need to support the solar industry which has been facing increasingly strong competition from state-supported Chinese manufacturers who acquired several leading German companies from the sector in the preceding year. This situation also shows that producers of renewable energy will lobby for solutions that best suit them, and that time pressure may be used against the government. Moreover, the takeovers of solar companies demonstrate that it will be difficult for the German government to identify the right level of subsidisation that will force companies to become competitive.

Energy companies operating in the German market, i.e. E.ON, RWE, Vattenfall and EnBW, have also fallen victim to the country's changing energy policy. Still in October 2010 the government promised them that their nuclear power plants would be allowed to continue operating to 2036, in return for which

[78] http://www.stern.de/wirtschaft/news/vermittlungsausschuss-bund-und-laender-einigen-sich-bei-solarfoerderung-1846973.html

a nuclear fuel tax and a renewable energy tax would be imposed on the companies[79]. The decision to withdraw from nuclear energy radically changed the companies' situation and forced them to modify their strategies. For many of them, the *Energiewende* became a factor that added to their deteriorating financial standing already damaged by high indebtedness, low electricity prices and high gas prices. RWE's net profits decreased by 45% to 1.8 billion euros in 2011. E.ON reported a loss of 2.2 billion euros in the same year, having made a profit of 5.9 billion euros the year before. RWE lost around 1.3 billion euros in revenue as a result of the *Energiewende* in 2011[80], while E.ON lost revenue of around 2.5 billion euros[81]. The scale of these companies' debts remains a problem. E.ON's debt in late 2011 totalled 36.4 billion euros, while RWE owed 29.9 billion euros and EnBW 8.7 billion euros.

The government's strategic U-turn forced the companies to seek greater savings, to sell their least profitable assets and to streamline employment. RWE plans to direct around 25% of its investments to the development of renewable energy to 2014 and to reduce its number of employees by 11% to 62,000. E.ON intends to cut its staff levels in Germany by 13% to 69,000 by 2015[82]. The companies also intend to sue the government for damages of 15 billion euros[83]. E.ON and RWE have already filed cases with the Constitutional Court, while Vattenfall intends to seek compensation before the World Bank's arbitration court where it has accused the government of violating its property rights as a foreign investor.

These companies' results in 2012 should be much better, especially given the reduction in the price of gas they are buying from Gazprom. In view of the projected decentralisation, though, it cannot be expected that their positions in the unconventional energy market will become as strong as in the conventional energy market. The *Energiewende* will therefore undermine the dominant role of major European energy companies. Meanwhile, it is unclear if the companies from the renewable energy sector will be able to become equally strong players.

79 http://www.osw.waw.pl/en/publikacje/ceweekly/2011-06-29/germany-rwe-and-eon-contest-obligation-to-pay-nuclear-fuel-tax

80 http://www1.wdr.de/themen/archiv/sp_energiekonzerne/rwehauptversammlung100.html

81 http://www.faz.net/aktuell/wirtschaft/wirtschaftspolitik/energiepolitik/energiekonzern-eon-schreibt-milliardenverlust-11683613.html

82 http://www1.wdr.de/themen/archiv/sp_energiekonzerne/eon242.html

83 http://www.spiegel.de/wirtschaft/unternehmen/atomausstieg-energieriesen-fordern-15-milliarden-euro-schadensersatz-a-838527.html

The situation of energy companies also reveals the scale of state intervention in the financing of the *Energiewende*, which is based on subsidising renewable energy producers at the expense of consumers and companies that produce conventional energy, as the bill surcharges benefit the producers of green energy and the exempted energy-intensive companies. Some large companies also benefit from the oversupply of renewable energy, which keeps prices of electricity down in wholesale trade, which again creates a burden on conventional energy producers (4.6 billion euros as part of the "Merit-Order-Effect"). The budget, on the other hand, benefits from taxes on renewable electricity (1.6 billion euros) paid by consumers and producers. In 2011, the budget provided 0.6 billion euros in green energy financing, to the benefit of renewable energy producers.

Attempts made by companies to exploit loopholes in the system of exemptions for energy-intensive companies are another example of the potentially distorting impact of state regulation on the market. Faced with such practices, the federal Ministry of the Environment was ultimately forced to amend the rules governing exemptions, as frequent cases of unduly claimed exemptions led to the remaining energy consumers having to pay higher surcharges. Under the original rules, the surcharge did not apply to companies consuming over 10 GW of electricity a year and those for which energy consumption represented more than 14% of added value. Some companies deliberately increased their electricity consumption or acquired more energy-consuming machinery in order to increase the proportion of electricity costs in production to over 14%. The ministry then decided to scrap the original system and only exempt electricity consumption beyond 1 GW. Due to this much lower threshold, the number of companies qualifying for exemptions increased, but the value of exemptions for companies whose consumption only slightly exceeded 1 GW decreased considerably.

5.6. Opinions of economic experts, associations and think tanks

Germany's academia and business circles have generally adopted a critical but also constructive attitude towards the *Energiewende*. Most reports published after the government's decision to phase out nuclear energy conclude that the *Energiewende* will be feasible, provided that numerous conditions are met with regard to the way it is financed, its timeframe and the development of infrastructure.

A report published by the **National Academy of Science and Engineering** (Deutsche Akademie der Technikwissenschaften e.V.) in September 2012 notes that, first of all, the current instruments of financial support for green energy

(under the EEG) are inadequate, and suggests that they should be replaced by a quota system (which would define the quantities of energy to be produced from a given renewable energy source)[84]. It also concludes that 300–500 billion euros worth of investments in renewable energy will be required to 2050[85]. According to the authors of the report, the entire project could be undermined if the costs of the *Energiewende* become excessive and, consequently, the public's approval for it wanes. One way to avoid such excessive costs and to implement the project effectively which the authors suggest is for the European Emissions Trading Scheme (EU ETS), an important instrument in reducing carbon emissions, should be strengthened. Other suggestions are that the *Energiewende* should be Europeanised, the transmission network should be developed according to the smart grid concept, and continuity of power supplies in the event of short interruptions should be ensured. The report also argues that political decisions regarding the direction of the future development of the *Energiewende*, which have currently been postponed, should ultimately be taken.

The main argument of experts from the **German Energy Agency** (Deutsche Energie-Agentur GmbH – DENA) is that renewable energy production has to be supplemented with energy from conventional sources. This is, in their view, the only way to achieve the energy transformation by 2050 without compromising stability. Their report demonstrates that Germany will become a net importer of energy in the long term (imports could reach 94 TWh in 2040 and as much as 134 TWh in 2050)[86]. At the same time, unused renewable energy and the absence of adequate ways to store it remain problematic. In order to carry out the *Energiewende* more effectively it will be necessary to develop transmission networks whilst ensuring that foreign electricity suppliers are ready to support the German energy market in case of a discontinuity of the domestic supply. If Germany is not able to make up for potential power shortages in this

[84] The German Renewable Energy Federation (Bundesverband Erneuerbare Energie e.V.) also advocates this solution, referring to data which show that the renewable energy surcharge provided for in EEG will increase to 2.3 euro cents per kWh in 2013, compared to 2.1 euro cents in 2012. Amounts collected at such a rate will be insufficient to effectively support the *Energiewende* according to BEE. Cf.: EEG-Umlage 2013: Förderbetrag für Erneuerbare Energien steigt auf 2,3 Cent pro Kilowattstunde Strom, http://www.bee-ev.de/3:1168/Meldungen/2012/EEG-Umlage-2013-Foerderbetrag-fuer-Erneuerbare-steigt-auf-2.3-Cent-pro-Kilowattstunde-Strom.html (27.09.2012)

[85] Cf. Die Energiewende finanzierbar gestalten Effiziente Ordnungspolitik für das Energiesystem der Zukunft, Deutsche Akademie der Technikwissenschaften e.V., September 2012, p. 4.

[86] Cf. Integration der erneuerbaren Energien in den deutsch-europäischen Strommarkt, August 2012, p. 24.

way, it will have to maintain a large percentage of "reliable energy sources", i.e. conventional power plants (which will automatically adversely affect carbon emissions reductions). DENA experts estimate that the existing grids will need to be extended by 12,900 km of new lines being constructed, and argue that works on infrastructure development should be brought forward[87]. The report also emphasises that electricity prices will tend to rise to 2050 (but does not state specific figures) as a result of the need to build new infrastructure, invest in renewable energy and ensure stable electricity supplies from conventional sources at times of lower renewable capacity. Finally, the report also argues that until 2050 it will not be possible to allow energy prices to be determined by market forces alone, as renewable energy will still need to be supported. The expected electricity price increases are, according to the DENA experts, a necessary element of the effort to reduce Germany's dependence on external energy resource supplies.

The Hamburg-based Institute of International Economics (WeltWirtschafts-Institut – HWWI) is another institution which has expressed criticism, mainly of the projected timeframe for the objectives of the *Energiewende* to be achieved. Its analysis presents reservations that mainly concern the feasibility of achieving savings in energy consumption by households and industry[88], while reducing consumption is necessary for the timely completion of the *Energiewende*. Based on their simulations, the authors of the HWWI report demonstrate that electricity consumption will increase along with the expected economic growth and society's continual technological advancement. The feasibility of substituting renewable energy for conventional energy is most at risk in the southern federal states of Germany where most of the nuclear power plants are located and infrastructure for generating electricity in conventional power plants are missing[89]. In order to fill this gap, the Institute calls for the creation of gas-fired power plants. HWWI also observes that wind power (especially offshore) has the highest potential as far as the development of green energy is concerned, and that in order to use this potential, transmission networks connecting the north with the south of Germany will need to be extended. HWWI experts argue that underground cables should be used for this purpose in order to ensure better public acceptance for infrastructure development (as underground cables do not distort landscapes). In order to guarantee the

87 Cf. *Ibidem*, p. 6.

88 Konsequenzen der Energiewende, Hamburgisches WeltWirtschaftsInstitut (HWWI), Juni 2012, p. 19.

89 Cf. *Ibidem*, p. 23.

stability of electricity supplies it will also be necessary to expand electricity storage capacity (including through the development of smart grid technologies). Network development and electricity storage are costly processes which, according to the authors of the report, will lead to rising electricity prices in Germany. Finally, in order for the *Energiewende* to succeed, it will be necessary to create a comprehensive programme of *Energiewende* investments, which may reach a total of 335 billion euros to 2030 according to HWWI's estimates[90].

A report on streamlining the implementation of the *Energiewende*, prepared by the **German Chamber of Commerce and Industry** (Deutscher Industrie- und Handelskammertag e.V. – DIHK)**,** is another important voice in the debate on the future directions the policy will take. DIHK experts call for better management and the creation of a single ministry in charge of all matters related to the *Energiewende*[91]. The most urgent problem according to DIHK, though, concerns the development of transmission networks. Work on this aspect should be brought forward with a view to producing a central plan of transmission network locations (the DIHK report covers the period up to autumn 2012) and increasing the numbers of staff dealing with the issuing of construction permits[92]. The chamber also criticises the way in which the *Energiewende* is partly financed by the surcharge under the EEG and calls for reform of this instrument, arguing that it mainly supports the production of solar and (offshore) wind power at the expense of the other sectors of the renewable energy industry. DIHK further argues that ensuring the stability of energy supplies is an important prerequisite of the success of the *Energiewende*. The authors of the report suggest that a governmental emergency plan in the event of power supply disruptions should be prepared and published in order to provide more stability to businesses during the course of the energy transformation. The DIHK report also insists that the *Energiewende* should become internationalised and, in particular, that Germany's neighbours should become involved. Internationalisation in this context refers to better communication between Germany and its partners, and more transparency in the German government's actions[93]. Finally, DIHK also sees opportunities for the *Energiewende*

90 Cf. *Ibidem*, p. 34.

91 The Federation of German Industry is one of the several other bodies that back the idea to establish single oversight over the *Energiewende*. Cf. Energieminister, in zehn Jahren, *Süddeutsche Zeitung*, 20.04.2012, http://www.sueddeutsche.de/wirtschaft/merkel-und-der-atomausstieg-energieminister-in-zehn-jahren-1.1338058, (02.10.2012).

92 Energiewende: Zehn Prioritäten für Politik und Wirtschaft, DIHK, 16.02.2012, p. 1.

93 DIHK has also published a document entitled "Energiewende europäisch denken!" in which it calls for the creation of an "open market in energy", a solution whereby the European

to be implemented more efficiently through greater energy savings, both by households and by industry. In this context, it is calling for government support for energy-saving measures (including by increasing the total amount of lending by KfW to 1.5 billion euros, by providing for tax breaks, and by offering consultancy for small and medium-sized entities)[94].

The Federation of German Industry (Bundesverband der Deutschen Industrie e. V. – BDI) argues that the subsidies for renewable energy should be reduced because of the need to safeguard Germany's social economy model and its competitiveness. A report published in September 2012 argues that the success of the *Energiewende* will largely depend on how the energy savings potential in the construction sector is utilised. The BDI therefore calls for the creation of a general financial and legal framework for German investments in this area[95]. The authors of the report also note that the Altmaier plan does not mention any initiatives concerning heat savings, as a result of which investors are facing uncertainty in this area and this potential source of energy efficiency gains is not being utilised. Moreover, the BDI supports Altmaier's pledge to hold broad public consultations on ways to store radioactive waste. The BDI also sees the need to dismantle Germany's nuclear power plants as an opportunity to develop new technologies and export them to international markets. Referring to the proposals presented in the Altmaier plan, the BDI is concerned about a possible ungainly expansion of bureaucracy that may stifle business in Germany[96]. As regards the need to ensure the stability of power supplies, the BDI report points to the potential of shale gas extraction and calls for more openness with regard to new methods of extracting gas from unconventional sources, provided that environmental protection standards are met.

Several *Energiewende* studies prepared by expert institutions raise the issue of the impact it will have on local communities. A **Deutsche Bank** report demonstrates that decisions at the federal level will be of fundamental importance for communities at the local level. Moreover, initiatives by municipalities and

Union should develop a common system to support renewable energy, which should also aim to subsidise Europe's green energy industry. Moreover, the authors also note that if no systemic solutions for the energy transformation are implemented, no new targets should be set for the production of renewable energy beyond 2020. Cf. Energiewende europäisch denken!, DIHK, 10 July 2012.

94 Cf. Energiewende: Zehn Prioritäten..., *op.cit*., p. 2-3.

95 Cf. BDI zum 10-Punkte-Programm für eine "Energie- und Umweltpolitik mit Ambition und Augenmaß", Bundesverband der Deutschen Industrie e.V., 11. September 2012, p. 4.

96 Cf. *Ibidem*, p. 6-7.

towns will play a significant role in effectively phasing out nuclear energy. This means new opportunities for local players, but also new challenges to the stability of their budgets[97]. In some cases the extra spending related to the *Energiewende* will force local governments to cut spending in other areas (e.g. in education). The Deutsche Bank experts also note the need to expand the transmission networks (and estimate that this will require investments worth 25 billion euros annually to 2030)[98]. Reaching agreement with local communities on the routing of transmission lines from the early stages of planning will also be very important. The Deutsche Bank report argues that the main potential for municipalities and towns lies in energy savings. This refers primarily to the modernisation of public buildings owned by the local governments (including schools, sports and leisure facilities), council housing and private homes. The main difficulty with this concept is involved with raising funds to finance this modernisation. However, the bank's experts argue that – given the rising prices of electricity – the upgrades will turn out to be profitable in the long term[99]. Further energy savings at the local level could be achieved by using energy in local public transport more effectively. The report also stresses the need to combine public and private financing in order to optimise the implementation of the *Energiewende*. Finally, the bank's experts call for more coordination among the different local players in order to improve the effectiveness of the *Energiewende*'s implementation.

Representatives of the chemicals industry have issued a very critical joint statement on the *Energiewende*. They argue that it can only be successful if the economy remains profitable and the social justice system remains in place. They are also calling for the creation of a single, central body in the federal administration to manage the *Energiewende* project[100]. The statement unequivocally argues that the *Energiewende* cannot be achieved by replacing nuclear energy with renewable energy alone. In order to carry out the transformation, it will be necessary to modernise and expand Germany's conventional power plants (both coal-fired and gas-fired) to ensure uninterrupted power supplies. The chemicals experts also claim that there is no big potential to increase

97 Cf. Germany's energy turnaround. Challenging for municipalities and municipal utilities, Deutsche Bank AG, September 17, 2012, p. 1.

98 Cf. *Ibidem*, p. 9.

99 Cf. *Ibidem*, p. 10.

100 Cf. Sichere und bezahlbare Energieversorgung für die chemische Industrie in Deutschland, Verbandes der Chemischen Industrie (VCI), Industriegewerkschaft Bergbau, Chemie, Energie (IG BCE) Bundesarbeitgeberverband Chemie e.V. (BAVC), September 2012, p. 3.

energy efficiency if the country experiences dynamic economic growth[101]. The statement represents a firm stance against the increases of electricity prices resulting from the need to finance the *Energiewende*, which, if the price rises by 1 cent/KWh, will create an additional burden of 500 million euros a year on the chemicals industry. Moreover, shutting down the nuclear power plants will lead, according to experts from the chemical industry, to rising carbon emissions (as new conventional power plants will have to be put into operation) and thus to direct losses for the industry whose companies will have to buy more expensive EU emissions allowances. The conclusion of this argument is that the current EU climate targets should not be raised. The authors of the statement are vocally demanding cuts to the financing of the *Energiewende* (as otherwise the burden on companies will be too high) and argue that the existing tax reliefs for companies should be kept in place[102].

The Osnabrück-based **Institute of Economic Structures Research** (Gesellschaft für Wirtschaftliche Strukturforschung GmbH, GWS) and the **Institute for Energy and Environmental Research** (Institut für Energie- und Umweltforschung, IFEU) from Heidelberg have both expressed a more optimistic position on the *Energiewende*. In a joint report, researchers from the two institutions project that it will create new jobs and improve the standard of living in Germany in the long term, especially in the regional context[103]. The report argues that there is major potential in improving energy efficiency (especially in transport), which can generate savings (around 21 billion euros in 2030) that will positively influence economic development and employment[104]. The report also underlines the particular opportunities that investments related to the *Energiewende* will create for municipalities and local communities. They will generate additional jobs in the renewable energy sector, especially in wind farms (the northern federal states) and in the manufacturing of subassemblies for renewable electricity installations (North Rhine-Westphalia and other federal states). The experts from Osnabrück and Heidelberg also argue that Germany's energy security will improve due to a reduced dependence on energy resource imports and less exposure to energy price fluctuations in international markets. Other important arguments in favour of the *Energiewende*

[101] Cf. *Ibidem*, p. 4.

[102] Cf. *Ibidem*, p. 5.

[103] Volkswirtschaftliche Effekte der Energiewende: Erneuerbare Energien und Energieeffizienz, Gesellschaft für Wirtschaftliche Strukturforschung, Institut für Energie- und Umweltforschung Heidelberg, Osnabrück - Heidelberg 2012, p. 3.

[104] Cf. *Ibidem*, p. 11.

which they mentioned in their report include improved energy efficiency and energy savings[105]. Finally, the report argues that the *Energiewende* will become a model for other countries to emulate and Germany may potentially become a major exporter of renewable energy technologies.

[105] Cf. *Ibidem*, p. 18.

IV. THE IMPACT OF THE *ENERGIEWENDE* ON GERMANY'S POLICIES IN EUROPE

1. Energiewende as an opportunity for Germany

The main reasons for Germany becoming one of the world's keenest advocates of renewable energy are: a desire to maintain Germany's high position in international trade[106], to protect the climate, and to escape dependence on energy resources. In 2007 Germany exported around 12 billion euros worth of renewable energy installations. Europe was the most important market for German companies from this sector, accounting for 45% of total green technology exports. Member states of the European Union were the destination for a decisive majority of those exports. The *Energiewende* project as it is now being implemented in Germany will contribute to a huge increase in internal demand for green technologies, but will presumably not stimulate mass production on a scale that would considerably increase profitability for manufacturers. It is also far from certain that EU countries, struggling with the economic crisis, will be able to buy more renewable energy installations. Consequently, the actual growth of green technology exports may be slower than in the projections of the German government, which foresee a volume in the foreign trade in such technologies which will reach 20 billion euros in 2020. Implementing the German model of energy transformation (or at least some elements of it) throughout the European Union would offer an opportunity to improve profitability in the green technologies sector and to stimulate exports. Developing transmission networks in the EU and their cross-border connections could be another way to bring down the cost of the *Energiewende* (electricity from conventional power plants, necessary to support the unstable renewable energy sources whose capacity depends on weather conditions, could be imported from neighbouring countries). Thus, Germany could avoid having to build state-of-the-art, small and effective power plants (which are in fact not economically viable) on its own territory[107].

[106] With the renewable energy sector becoming a driving force for the entire German economy. According to analyses from the German Ministry of Environment, the sale of green technologies in 2020 could reach a volume equivalent to the combined sales volumes of the automotive and machine-building industries, presently the most important sectors of the German economy in terms of exports.In the years 2004–2010 employment in the renewable energy sector increased by 129%.
http://www.bmu.de/files/pdfs/allgemein/application/pdf/ee_sachstand_bf.pdf

[107] http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2011A47_fis_gdn_ks.pdf

The objective of Germany's policy will be to build a coalition of states as broad as is possible, to which the German minister for the environment Peter Altmaier referred as the "Klub der Energiewendestaaten"[108]. Its members will be pioneer countries willing to pursue their own energy transformations. Their actions will demonstrate that the *Energiewende* creates economic opportunities and that climate protection and economic growth are not mutually exclusive pursuits, but are rather two sides of the same coin.

2. Europeanising the *Energiewende*

"If the energy transformation is to succeed, it has to be supported by political initiatives at the EU level"[109]. This rather obvious conclusion is shared not only by German experts, but also by politicians, irrespective of their party affiliations. If a recent plan presented by the German Ministry of the Environment, party documents, and recommendations presented to the German government by renowned research institutes[110] are analysed, it is possible to outline an agenda of action which the German leadership is likely to take to the EU forum. Germany's initiatives will not only be geared towards facilitating the implementation of the *Energiewende* in Germany itself, but also to extending the German energy model to other EU countries in order to create synergies. The fact that the *Energiewende* is an increasingly important issue in the contexts of climate protection and energy security (also with regard to access to energy resources and transmission routes), it will be a challenge for Germany's policy not only in Europe, but also globally.

The greatest obstacle to spreading the *Energiewende* in the EU consists in the absence of a common EU energy policy that would create a legal and institutional framework conducive to the development of green technologies and which would promote renewable energy with a view to increasing its share in the energy mixes of the EU Member States. German experts conclude that the current situation, in which nation states decide on their energy policies, is anachronistic because it neither safeguards the EU's

[108] http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2011A47_fis_gdn_ks.pdf

[109] http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2011A47_fis_gdn_ks.pdf

[110] Chapter based on an analysis of the following documents:
http://www.bmu.de/strategien_und_bilanzen/publ/49041.php
http://www.cep.eu/analysen-zur-eu-politik/energie/studie-erneuerbare-energien/
http://www.swp-berlin.org/de/nc/swp-themendossiers/energiepolitik/eu-energiepolitik/print/1.html

energy security, nor achieves reductions in carbon emissions, and energy policy should therefore be regulated at the level of the European Union. The example of Poland is often raised in this context, as a country that sticks to its energy mix based on coal and in this way impedes climate protection and the development of green technologies.

According to analysts from the German Institute for International and Security Affairs (SWP), further development of green technologies will depend on whether the EU members reach agreement on three crucial energy policy issues: (1) the extension and modernisation of transmission networks, (2) setting common climate protection targets and introducing a binding minimum target for renewable energy's share in the energy mixes of individual states; and (3) the creation of mechanisms to subsidise green technologies that will be sufficiently attractive to ensure the security of investments and thus make green technologies profitable.

As has already been discussed in this report, so far the greatest problem of the *Energiewende* concerns the complexity of the **development of the transmission network.** A year after the decision on the *Energiewende* was taken, Germany has managed to build only a very small proportion of the thousands of kilometres of projected transmission lines. The reasons for this slow progress include: banks being unwilling to lend to this kind of undertaking; legal difficulties related to the protracted processes of expropriating land for transmission lines; and citizen protests (while declared support for the *Energiewende* in Germany is huge, in reality the Not In My Back Yard (NIMBY) and Built Absolutely Nothing, Anywhere Near Anything (BANANA) attitudes prevail).

Therefore, Germany is likely to demand or promote initiatives that will support the development and integration of networks, both within Germany and across borders in the EU, including through financing at the EU level. Indeed, on 29 June 2011 the European Commission adopted a communication "Budget for Europe 2020" on the next multiannual financial framework for the years 2014–2020, in which it proposed the creation of an instrument called "Connecting Europe" in order to support a full rollout of the priority energy, transport and IT infrastructures with a single fund worth 40 billion euros, of which 9.1 billion euros would be earmarked for energy[111].

[111] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0658:FIN:PL:PDF

Another step towards making the *Energiewende* a reality could consist in **introducing mechanisms to support green technologies at the EU level**, including through increased spending from the EU budget. This would generate considerable gains for Germany as the largest exporter of these technologies. The objective, however, would not be to harmonise subsidies for renewable energy throughout the EU. The German subsidies are so high that their beneficiaries would lose out if the scheme became "Europeanised". Besides, Germany would risk being pressured to support the energy transformation processes in other countries. Meanwhile, MPs from the SPD have criticised the EU commissioner for energy Günther Oettinger, claiming that the EU plans for the development of energy, outlined by the European Commission in its Road Map 2050, place insufficient emphasis on the role of renewable energy sources. The SPD have called for a reorientation of energy systems in the EU towards renewable energy and energy efficiency, and for nuclear and coal power to be phased out entirely in the EU[112]. Such attitudes will presumably become increasingly common in Germany.

Introducing legal safeguards for the privileged position of renewable energy *vis-à-vis*, for instance, energy from nuclear power plants or unconventional (shale) gas would lower the production costs of both green technologies and renewable energy. To this end, the German government may seek for stricter binding EU safety standards for nuclear power plants to be imposed. In March 2011 the European Commission was requested to review legislation in this field. At the same time (15 March) the SPD political grouping in the Bundestag filed a motion demanding amendments to the Euratom treaty: "The Treaty establishing the European Atomic Energy Community (Euratom) should be adapted to meet future challenges. The federal government should take measures to call an international conference 'as soon as possible' with a view to thoroughly reviewing the treaty. The special position of nuclear energy should be abolished on that occasion, and the funds thus freed should be invested in the research and development of renewable energy outside the framework of the treaty".

With regard to shale gas, on the other hand, the German government has decided not to take any decision yet. The research of a German institute of geology has revealed that the country possesses huge unconventional deposits of gas. Germany is aware that it will be able to use them if necessary, either by launching extraction, or as a bargaining chip, e.g. in price negotiations with Gazprom.

[112] http://www.euractiv.de/energie-und-klimaschutz/artikel/friedrich-kommission-unterschatzt-potenzial-der-erneuerbaren-energien-005889

Raising the binding targets for greenhouse gas emissions cuts in the European Union[113] – as a result of which the prices of emissions allowances would increase – would also help Germany achieve its energy transformation. The increase in the budget of the Energy and Climate Fund, which will take over the total revenue from Germany's additional emissions allowances, was supposed to be the single biggest new source of financing for the *Energiewende*. In March 2012, the European Parliament called on the European Commission to introduce mechanisms that would reverse the downward trend of prices in CO_2 emissions trading. Under the EU climate and energy package, the EU member states are obliged to reduce their greenhouse gas emissions by 20% below 1990 levels to 2020. However, many European politicians, including in Germany, want the emission reductions target to be increased to at least 30%. The European Parliament's Environment Committee estimates that if the reductions target is raised from 20% to 30%, the annual cost of CO_2 emissions cuts in all EU countries would increase to around 11 billion euros to 2020. Those lobbying for the higher binding targets openly admit that a large part of their motivation is the wish to boost the price of emissions allowances. This will improve the profitability of investments in green, low-emission and efficient power plants and technologies, the development of which is one of the main objectives of the EU's climate policy. According to the European Commission, raising the emissions reduction target from 20% to 30% could result in a rise in the price of emissions allowances to only 30 euros. Estimates by Deutsche Bank and Barclays, however, show that the price could reach as much as 60–70 euros per tonne[114].

A report by EnergSys suggests that the economic benefits of this policy will consist mainly in the development of low-emissions installations and services. Considering the level of Germany's technological advancement and the fact that Germany is, along with China, a leader in the export of low-emissions technologies, the changes caused by EU climate policy will lead to an increase in exports of German devices and installations (wind farms, solar and biogas technologies). The policy will also lead to considerably higher investments in new, low-emissions power generation capacity in energy sectors across the EU member states. This also will be conducive to the development of the industry and the creation of jobs in Germany[115].

[113] http://www.handelsblatt.com/politik/international/klimapolitik-eu-parlament-fordert-eingriffe-in-den-emissionshandel/6332184.html

[114] Quoted after: http://m.obserwatorfinansowy.pl/tematyka/biznes/ambicje-ue-w-sprawie-co2-oznaczaja-miliardowe-wydatki-dla-polski/

[115] http://www.kig.pl/files/SYNTEZA%20RAPORT%202050%20W_POLSKA.pdf

Phasing out nuclear energy and moving to renewable energy in a revolutionary manner will need to be supported by conventional energy, especially gas power ("Without nuclear energy, Germany will be even more interested in gas supplies from Russia in the future[116]"). Therefore, the German government's next steps at the EU level will most likely consist not only in attempts to mitigate the provisions of the third energy package in favour of the Russian monopoly Gazprom, but also in giving a green light to the construction of more branches of the Nord Stream gas pipeline. Indeed, on 11 May 2012 the shareholders of Nord Stream AG decided that it will, within the next eight months, prepare a feasibility study on the construction of additional branches (one or two) of the gas pipeline. On 31 May 2012 Chancellor Merkel during a meeting of the Council of the Baltic States declared that she would not object to the possible construction of a third and a fourth branch of the Nord Stream pipeline, provided that the project is economically justified.

3. The next step: globalisation

"The German energy transformation which aims at phasing out both nuclear and coal-based energy generation is of significance for the whole world. A global approach is important especially if we are serious about the dual task of protecting the climate and ensuring energy security in the long term"[117]. The Germans see making the *Energiewende* international as the next step after Europeanisation to bring them closer to accomplishing the energy transformation. The objective is, firstly, to reduce the cost of transformation by sharing it among many countries, secondly, to find new markets and, finally, to establish the energy transformation as a "speciality" of German diplomacy and a trademark of German foreign policy. The Germans assume that developing countries such as China or India, which are now facing the choice between fast growth and climate protection, will always opt for economic growth. Peter Altmaier, the German minister for the environment, is very understanding of this attitude, but at the same time he would like to encourage the less affluent countries to purchase German green technologies that will enable them to develop equally rapidly, but without harming the environment with excessive carbon emissions. The German leadership is convinced that the more densely popu-

[116] A statement by the spokespersons for economic affairs of the CDU/CSU and FDP parliamentary grouping. The EU energy commissioner Günther Oettinger also said, already after the German government's decision, that gas will remain the principal fuel of growth: "More renewable sources also means more gas".

[117] http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2012A37_wep.pdf

lated countries such as China or India will sooner or later have to transform into low-emissions economies unless they are prepared to face the unpredictable consequences of environmental pollution.

As with the Europeanisation of the *Energiewende*, the objectives behind the global approach include promoting the wider use of renewable energy sources, strengthening the market competitiveness of renewable energy technologies worldwide, actively supporting the phasing out of other energy sources such as coal and nuclear power, and investing in gas as the best transitional energy source to support the development of renewable energy. With such objectives in mind, Germany has to pursue – on a global scale – similar actions with respect to renewable energy, nuclear power and coal and gas producers as the ones it is calling for at the EU level. The country should, then, be expected to offer political support, also in international forums, to any undertakings aimed at phasing out nuclear and coal power, and to demand measures to facilitate the production and sale of renewable energy technologies and renewable electricity. It may also obstruct projects related to shale gas extraction as posing an environmental hazard, and will maintain good relations with the producers and exporters of natural gas, such as Russia.

Germany's diplomatic offensive will aim at promoting the idea of the *Energiewende* as a solution to all the problems related to the depletion of natural resources or access to energy resources. To this end, it will use both German institutions (which are now engaging in "energy diplomacy"[118]), and international bodies such as IRENA[119].

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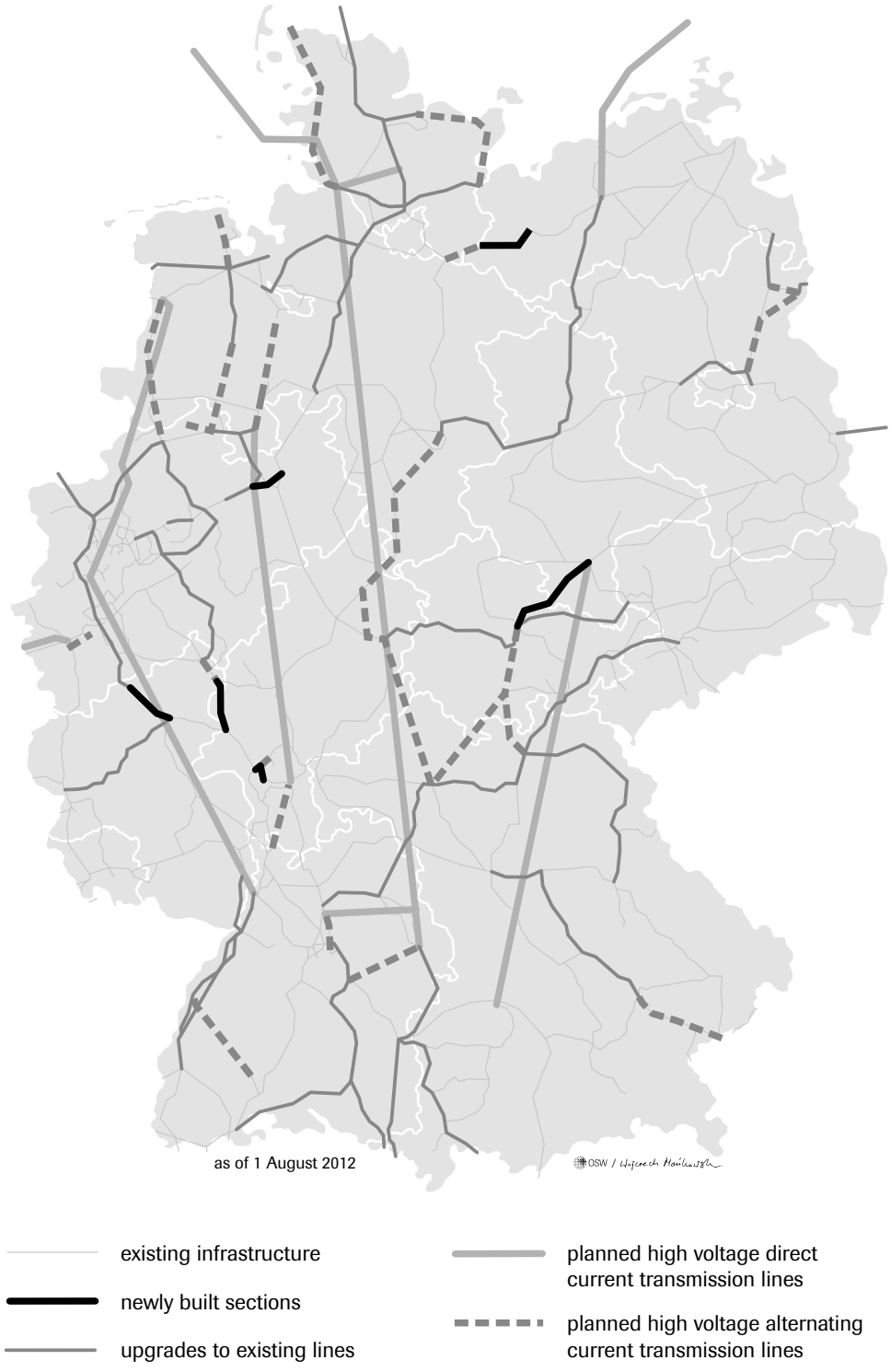
[118] http://www.fvee.de/fileadmin/publikationen/Themenhefte/th2009/th2009_03_03.pdf

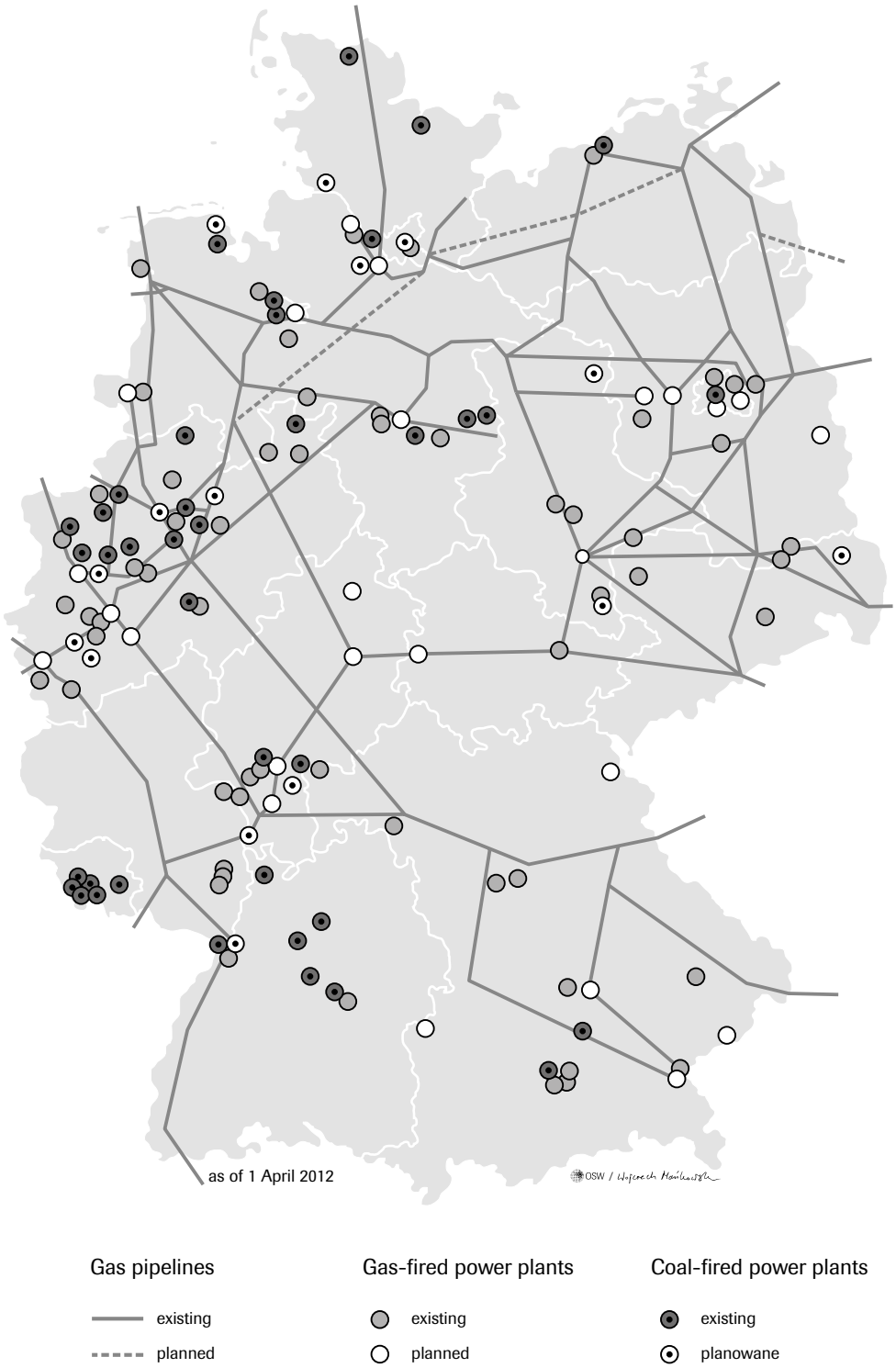
[119] http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=13&CatID=30&SubcatID=67

Map 1. Status of transmission grid extensions in Germany



Source: Netzentwicklungsplan Gas 2012, German gas pipeline operators

Map 2. Planned extensions of conventional power plants and gas pipelines



Source: Netzentwicklungsplan Gas 2012, German gas pipeline operators