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## The expensive energy revolution in Germany The implementation of the *Energiewende* is behind schedule

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One year after the events of Fukushima the implementation of the new German energy strategy adopted in the summer of 2011 is being verified. Business circles, experts and publicists are sounding the alarm. The tempo at which the German economy is being rearranged in order that it uses renewable energy sources is so that it has turned out to be an extremely difficult and expensive task. The implementation of the key guidelines of the new strategy, such as the development of the transmission networks and the construction of new conventional power plants, is meeting increasing resistance in the form of economic and legal difficulties. The development of the green technologies sector is also posing problems. The solar energy industry, for example, is excessively subsidised, whereas the subsidies for the construction of maritime wind farms are too low. At present, only those guidelines of the strategy which are evaluated as economically feasible by investors or which receive adequate financial support from the state have a chance of being carried through. The strategy may also turn out to be unsuccessful due to the lack of a comprehensive coordination of its implementation and the financial burden its introduction entails for both the public and the economy. In the immediate future, the German government will make efforts not only to revise its internal regulations in order to enable the realisation of the energy transformation; it is also likely to undertake a number of measures at the EU forum which will facilitate this realisation. One should expect that the German government will actively support the financing of both the development of the energy networks in EU member states and the development of renewable energy sources in the energy sector.

### The guidelines of the new German energy strategy...

The key guidelines of the new German energy strategy are: withdrawal from the use of nuclear energy by 2022<sup>1</sup>, a more extensive use of renewable energy sources (RES), the development of transmission networks, the construction of new conventional power plants and an improvement in energy efficiency. This strategy is to be based primarily on the advancement of renewable sources of energy. Pursuant to the amended RES Act, the share of renewable energy in power production is to gradually increase from 17%<sup>2</sup> at present to

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<sup>1</sup> When the amended nuclear energy act came into force in June 2011, the decommissioning of eight of the seventeen reactors operating in Germany began. The remaining nine are to be gradually decommissioned in 2014–2022.

<sup>2</sup> Germany holds sixth position in Europe in terms of power production using renewable sources of energy. Austria has the largest share (approximately 70%) of power produced from renewable energy in Europe. The other leaders are Sweden (60%), Portugal (39%), Finland (31%) and Spain (29%). Source: [www.eurostat.com](http://www.eurostat.com)

approximately 38% in 2020. This share is to reach approximately 50% in 2030, 65% in 2040 and as much as 80% in 2050 (see Appendix). The amended RES Act envisages higher subsidies for maritime wind power (offshore wind farms) and geothermal energy (heat pumps), and a reduction of the subsidies for solar power. A special role has been assigned to the development of the German transmission networks in the new energy strategy. The act on their accelerated development (the construction period is to be shortened from ten to four years) envisages that approximately 4,450 km of transmission networks will be created, mainly to provide a connection between the northern federal states (where the wind farms will produce power) and the south of the country (which, being highly industrialised, will be affected most of all by the lack of nuclear power). The replacement of nuclear power with renewable power is to be accompanied by the construction of small, efficient and modern conventional power plants as well as energy storage facilities. Support from conventional power plants is necessary, because they ensure uninterrupted electricity supplies to consumers, which RES power plants cannot guarantee (for example, in windless weather or when the wind is too strong, wind farms do not work). According to the strategy, 10 GW of new output is to be ensured by 2020 at conventional power plants (using coal and gas).

### ...and the difficulties with putting them into practice

The greatest difficulties in the implementation of the strategy are linked to the development of the transmission networks. Although, according to the operators who manage the networks in Germany, one third of all the lines are operating to capacity<sup>3</sup>, only 200 km of the planned 4,000 km of networks have been built thus far. The reasons for the standstill in this sector include both banks' unwillingness to give credit to such ventures and the legal problems related to long-lasting processes of expropriation of the land where the networks are to be built, and public protests (the declared support for *Energiewende* is vast across Germany, however, the well-known NIMBY – Not In My Back Yard – principle applies here)<sup>4</sup>.

<sup>3</sup> [http://www.focus.de/immobilien/energiesparen/energieversorgung-stromkollaps-mit-anzeige\\_aid\\_712742.html](http://www.focus.de/immobilien/energiesparen/energieversorgung-stromkollaps-mit-anzeige_aid_712742.html)

<sup>4</sup> See above.

**The implementation of the key guidelines of the new strategy, such as the development of the transmission networks and the construction of new conventional power plants, is meeting increasing resistance in the form of economic and legal difficulties.**

As regards the conventional energy sector, which is to support the development of renewable energy sources, the main problem is low cost-efficiency. Neither German nor foreign companies are willing to invest in new conventional power plants due to: (a) the low cost-efficiency of the construction and operation of gas and coal power plants, given the perspective of RES development in Germany<sup>5</sup>, (b) the low or negative margins on sales of gas in Ger-

<sup>5</sup> The cost-effectiveness of the use of conventional power plants in Europe is also in doubt due to the fact that after 2013 energy companies will have to purchase CO<sub>2</sub> emission certificates, the prices of which fluctuate significantly on financial markets.

many, (c) the high competitiveness and diversification of the conventional energy market, in particular the gas market<sup>6</sup>, and (d) the adverse financial situation of German companies (RWE has debts of 27 billion euros, and the debts of E.ON stand at 16 billion euros). Even those investments which are already underway are at risk. It is unclear whether RWE and E.ON will complete the construction of the coal power plants in the Ruhr Metropolitan Region and in the eastern federal states, and of the small gas power plants in the south of the country (see Appendix). Even those foreign companies which have access to their own raw materials are not so eager to invest on the German market as had been expected<sup>7</sup>.

<sup>6</sup> Hundreds of firms engaged in the production and distribution of natural gas operate on the German market, as a consequence of which this market is highly competitive and is characterised by low margins.

Another problem is the development of the offshore wind power sector, which may be slowed down due to difficulties with connecting the farms by submarine cables to the power networks on land. Network operators point out that the technologies of laying the submarine cable and connections between the wind turbines ('cluster connections') are new and

<sup>7</sup> Russia's Gazprom has chosen not to co-operate with RWE for the time being due to the low cost-efficiency of investments on the German gas market. RWE is holding unofficial talks regarding this issue with another Russian company, Inter RAO.

complex solutions, which have not been used on a broad scale in Germany so far. These solutions, if applied, will significantly lengthen the time of making the connections to the wind farms and are, furthermore, very expensive<sup>8</sup>. The German companies E.ON, RWE and EnBW have threatened they will withhold their investments, unless offshore wind farms are properly integrated into the network.

The solar power sector also needs to deal with economic problems. The system for subsidising RES in Germany was devised in such a way that the solar power sector received the largest subsidies<sup>9</sup>. These subsidies increased as new solar cells were installed, and the costs were transferred to the bills paid by German consumers. This system has led not only to an excessive increase in the number of companies operating in the photovoltaics industry but also to overproduction of solar power, which cannot be sent anywhere due to the lack of

<sup>8</sup> EnBW is building the first offshore wind farms in the Baltic Sea: Baltic 1 and 2, while RWE and E.ON are building offshore wind farms in the North Sea next to the island of Heligoland.

<sup>9</sup> The solar energy sector received approximately 7 billion euros of subsidies in 2011 (calculations on the basis of data from the Federal Statistical Office).

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connections to the network and for which subsidies are due anyway. Therefore, the latest draft amendment of the RES Act of 9 March 2012 provides for a reduction in subsidies for solar power in 2012 by 30%. The government's actions seem reasonable because this sector, which produces only 3% of electricity in Germany, used to receive 50% of all subsidies allocated for RES. On the other hand, further cuts of subsidies result in financial losses and bankruptcies of German firms from

the solar energy sector, including companies from Thuringia, Saxony-Anhalt and Brandenburg, which are among the driving forces which boost development of the eastern federal states. Another problem in the German solar power industry is the competition from Chinese manufacturers, who offer much cheaper equipment and also benefit from the German subsidies system (50% of the solar cells operating on the German market originate from China). It is difficult to improve energy efficiency mainly due to the lack of legal regulations. No law that would regulate this has been included in German legislation due to a dispute taking place in the country. This dispute is at several levels: between the governing coalition (the CDU/CSU and the FDP) and the opposition (the SPD and the Green Party), who insist that more expenses should be allocated for this purpose; between the federal government and the governments of individual federal states (over the distribution of expenses); and between Minister of Economy Philipp Roesler (FDP) and Minister of Environment Norbert Roettgen (CDU), who wants expenditure on the thermal insulation of buildings to be above 1.5 billion euros<sup>10</sup>. The two ministers recently reached a compromise on the German government's common stance on improving energy efficiency in the EU. The government is planning to put forward its proposal for an EU directive concerning energy efficiency (binding upon all EU member states), which offers the freedom of choice only in one issue: whether the growth in energy efficiency should be 1.5% or 2.1% annually.

<sup>10</sup> 40% of the energy is consumed by the housing sector. If buildings and heating technologies were modernised, energy consumption could decrease significantly. The act allocates 1.5 billion euros annually for this purpose.

### The government is saving its own strategy

To carry through the energy strategy, the German government will need to introduce a number of legal changes, i.e. to take care of the complete implementation of the laws on which the energy transformation is based, to implement comprehensive management of the project and to offer economic incentives to investors.

Two laws from the package of the legal acts accompanying the *Energiewende* have not yet been adopted in the Bundestag – the act on the improvement of energy efficiency and

the act on underground storage of CO<sub>2</sub>, 'the CCS (Carbon Capture and Storage) Act'<sup>11</sup>. The former is likely to be adopted, while the latter has no chance of being supported in the Bundesrat due to resistance from the federal states. The other acts in the governmental package must be supplemented to include incentives for investments and fiscal facilitations for those who invest in the development of the networks, provisions that would shorten the construction permit wait time and those that would accelerate the expropriation process.

At present, there is no central agency in charge of the management of the new strategy that would coordinate all activities and the public dialogue, and which would also work on a compromise between the central government and the governments of individual federal states. Too many entities are responsible for the German energy transformation. Its coordination is among the prerogatives of both Minister of Economy Philipp Roesler (FDP) and Minister of Environment Norbert Roettgen (CDU), who are at the same time the main opponents to each other. Some decisions concerning *Energiewende* are also to be taken partly by the minister of science (research in the RES sector in the broader meaning of the term), the minister of infrastructure (modernisation of buildings) and the minister of finance. Experts suggest a position of a government commissioner for the energy transformation or a special ministry for energy should be created. An alternative

<sup>11</sup> The CCS Act envisages the use of clean coal technologies, which could provide an alternative to RES technologies. Due to fears of ecological threats, local communities do not wish even CCS pilot projects to be implemented.

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suggestion is that Chancellor Angela Merkel should directly take over the supervision of the implementation of this strategy.

*Energiewende* would be much easier to implement, if Germany's largest energy companies became engaged in it. Only two months following the presentation of the new strategy, the companies operating on the German market (E.ON, RWE, EnBW and Vattenfall) noticed the opportu-

nities to derive profits in this sector and announced modification of their policies. It includes debt reduction (through the sale of assets in the sectors where low profits are forecast) in order to increase their investment capital to be allocated for the development of the renewable energy sector (EnBW allocated 10 billion euros for investments in RES by 2020, while RWE will spend 5 billion euros by 2015). The senior executives of these companies are unwilling to invest in the construction of new blocks in conventional power plants and network development mainly because doing business in these sectors is unprofitable.

The implementation of the new energy strategy will affect the economy and raise the cost of energy supplied to German consumers. Subsidies allocated for RES in 2011 reached 13 billion euros. The costs of the development of the renewable energy sector and the transmission networks will be incurred by everyone: from representatives of heavy industry to individual electricity users. The operators of Germany's four largest transmission networks (50 Hertz, Amprion, EnBW Transportnetze and TenneT<sup>12</sup>) have published a medium-term forecast concerning the development of renewable energy sources (RES) in Germany. According to their data, the development of the RES sector may lead to an increase in electricity prices by as much as 30% until 2013, which in turn will cause higher inflation and food prices. The electricity charges include a tax on the development of renewable energy, which is increasing as the RES are developing, and – in the opinion of the Federation of German Consumer Organisations – is to reach 4.5 cents/kWh next year, although the government has promised it will not be higher than 3.5 cents/kWh. It will still take a long time before the total costs of the implementation of the new energy strategy can be precisely assessed. Reports from various research centres and economists present very different estimates, ranging from 20 billion to 300 billion euros to 2020 (without considering the costs of decommissioning and the disassembly of the nuclear power plants and of increasing electricity prices).

<sup>12</sup> Transmission networks are built by the network operators: TenneT in the northern and southern federal states (this is a Dutch company, 100% state-owned); Amprion in the western federal states (a large stake of it is controlled by financial institutions from Switzerland and Germany) and 50 Hertz in the eastern federal states (a greater part of it is owned by the Belgian network operator, Elia).



## Conclusion

**The energy transformation in Germany is not perceived as an element of protection of the natural environment but primarily as part of the state's economic and social policy.**

The importance this project has for the German government can be seen in the terminology used by Chancellor Angela Merkel and the ministers of economy and environment when referring to this change. It is described as a "great chance for Germany"<sup>13</sup>, a project comparable to a new unification of Germany<sup>14</sup> or a "task for the nation" in which all Germans need to participate<sup>15</sup>. Such strong engagement from politicians and the activity of an exceptionally strong lobby supporting green technologies are turning the energy transformation into an ideological issue. Thus a new 'taboo topic in German politics'<sup>16</sup> is being created, which does not allow a cool-headed analysis to be made of the costs or an evaluation of the schedule of introducing the changes in the German energy system.

**Energiewende as a 'new social deal' is to consolidate German society using this as a pivotal idea, to bring sense to this policy, but first of all to become a catalyst and stimulus for innovation, technological development and a new driving force of the German economy.**

Germany is already one of the largest manufacturers and exporters of green technologies<sup>17</sup>. *Energiewende* is also presented as an antidote to dependence on imports of raw materials, a chance for maintaining a high position in international trade<sup>18</sup> and a way to escape the consequences of 'peak oil'<sup>19</sup>.

**These goals would be much easier to achieve, if Germany adopted an evolutionary approach to replacing its nuclear and conventional power plants with those based on renewable energy sources.** The sudden resignation from the support offered by the nuclear power plants and the absence of a coordination of activity as part of *Energiewende* has

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brought about great dissatisfaction in business circles, anxiety among experts and alarmist reports from the media. The stock exchange index where thirty companies from the green technologies sector are listed has fallen by approximately 60% since April 2011<sup>20</sup>. The share prices of the largest energy companies (which are to take part in the implementation of the new energy strategy along with the sector of small and medium-sized companies), especially of E.ON and RWE, dropped immediately after the German government's decision to phase out the nuclear energy sector was announced. According to fore-

casts, the combined debt of the four largest energy companies (RWE, E.ON, EnBW and Vattenfall) may increase by approximately 20 billion euros<sup>21</sup>. In turn, German experts are warning of the growing threat of dependence on Russian gas<sup>22</sup> and also on neodymium, an element necessary for the production of modern wind turbines, which is imported from China<sup>23</sup>. Furthermore, the government of Bavaria has threatened it will not participate in the *Energiewende* project, unless it receives special support, including financially<sup>24</sup>. Incidentally, the Bavarian government's attitude to the development of the Czech nuclear power plant in Temelin can be described as at least neutral, if not positive<sup>25</sup>.

**In addition to streamlining the decision-making processes and the implementation of the next stages of the energy transformation in Germany, the chances of success for**

<sup>13</sup> <http://www.tagesschau.de/inland/atomausstieg176.html>

<sup>14</sup> <http://videokatalog.handelsblatt.com/Politik/Ressorts/Wirtschaftspolitik/video-R%C3%B6sler-Die-Energiewende-ist-so-schwierig-wie-die-Wiedervereinigung-Interview-144918.html>

<sup>15</sup> <http://www.faz.net/aktuell/wirtschaft/energiepolitik-der-masterplan-fuer-die-deutsche-energiewende-11558633.html>

<sup>16</sup> <http://www.euractiv.de/energie-und-klimaschutz/artikel/wie-sinnvoll-ist-die-gruene-umweltpolitik-005995>

<sup>17</sup> <http://www.faz.net/aktuell/wirtschaft/energiepolitik-der-masterplan-fuer-die-deutsche-energiewende-11558633.html>

<sup>18</sup> According to analyses of the German Ministry for the Protection of the Natural Environment, sales of green technologies in 2020 would reach a level equivalent to the total sales of the car and machine industries, the sectors which have been playing the most important role in German exports so far.

<sup>19</sup> <http://www.osw.waw.pl/en/publikacje/osw-commentary/2011-02-08/natural-resources-deficit-implications-german-politics>

<sup>20</sup> [http://www.onvista.de/index/snapshot.html?ID\\_NOTATION=17959531&MONTH-S=12#chart](http://www.onvista.de/index/snapshot.html?ID_NOTATION=17959531&MONTH-S=12#chart)

<sup>21</sup> <http://www.osw.waw.pl/en/publikacje/osw-commentary/2011-10-24/german-companies-strengthen-their-cooperation-russian-gas-supply>

<sup>22</sup> <http://www.swp-berlin.org/de/publikationen/kurz-gesagt/energiewende-und-gas.html>

<sup>23</sup> <http://daserste.ndr.de/panorama/archiv/2011/windkraft189.html>

<sup>24</sup> <http://www.verivox.de/nachrichten/energiewende-bayern-droht-bund-mit-sonderweg-83695.aspx>

<sup>25</sup> <http://www.osw.waw.pl/en/publikacje/cewe-ekly/2011-12-01/warmer-czechbavarian-relations>

**Energiewende can be improved by shifting the problem to the EU level. This has been admitted by German experts: “if energy transformation in Germany is to be successful, it must be backed up with political initiatives at the EU level”<sup>26</sup>.** Therefore, it may be expected that representatives of the German government will take measures to push through or back initiatives in the following areas: (a) supporting the development and coordination of networks, both German and cross-border, including financing them from EU sources (the proposed sum is 9.1 billion euros for 2014–2020 as part of TEN-E<sup>27</sup>); (b) propagating the German model of energy transformation in Europe in order to boost the demand for, and thus cost-effectiveness of, green technologies; (c) including the mechanisms for supporting green technologies at the EU level<sup>28</sup> (including increasing the spending from the EU budget on green technologies, which will offer Germany – the leading exporter of these technologies – significant revenues, thus reducing the negative net balance; (d) imposing a stricter carbon emission reduction level in the EU reduction target<sup>29</sup>; (e) imposing stricter safety criteria regarding nuclear power plants in the EU upon all the member states<sup>30</sup>; and (f) softening the provisions of the EU Third Energy Package to the benefit of the Russian monopoly, Gazprom, because “without nuclear power, Germany will be even more interested in Russian gas supplies in the future”<sup>31</sup>. German experts claim that energy policy determined by national states is a relic and neither guarantees energy security to the EU nor reduces carbon emissions, and it must therefore be regulated at the EU level.

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<sup>26</sup> [http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2012A08\\_fis\\_gdn.pdf](http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2012A08_fis_gdn.pdf); [http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2011A47\\_fis\\_gdn\\_ks.pdf](http://www.swp-berlin.org/fileadmin/contents/products/aktuell/2011A47_fis_gdn_ks.pdf)

<sup>27</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0658:FIN:PL:PDF>

<sup>28</sup> MPs from the SPD have reproached the EU Commissioner for Energy, Guenther Oettinger, for the fact that the plans for the development of the energy sector in the EU presented by the European Commission in the Road Map 2050 insufficiently emphasise the role of RES. The Social Democrats insist that energy systems in the EU should be based on RES and energy efficiency, and that nuclear and coal power plants should be totally eliminated in the EU. <http://www.euractiv.de/energie-und-klimaschutz/artikel/friedrich-kommission-unterschatzt-potenzial-der-erneuerbaren-energien-005889>

<sup>29</sup> <http://www.handelsblatt.com/politik/international/klimapolitik-eu-parlament-fordert-eingriffe-in-den-emissionshandel/6332184.html>

<sup>30</sup> On 15 March, members of the SPD submitted a motion at the Bundestag with demands to amend the Euratom treaty: “The Treaty establishing the European Atomic Energy Community (Euratom) should be adjusted to the future challenges. The federal government should take action to cause that an intergovernmental conference is convened as soon as possible in order to amend the treaty substantially. The special position of the nuclear power sector should be withdrawn on that occasion. The funds which become available as a consequence of this should be invested in scientific research and development of the energy sector based on renewable sources outside the framework of the treaty.”

<sup>31</sup> A statement from spokesmen for the parliamentary groups dealing with economic issues representing the CDU/CSU and the FDP. The EU Commissioner for Energy, Guenther Oettinger, said after the decision made by the German government that natural gas would be the main driving force for growth: “more renewable sources also means more gas.”

## APPENDICES

### 1. Planned conventional power plants in Germany

#### Gas pipelines

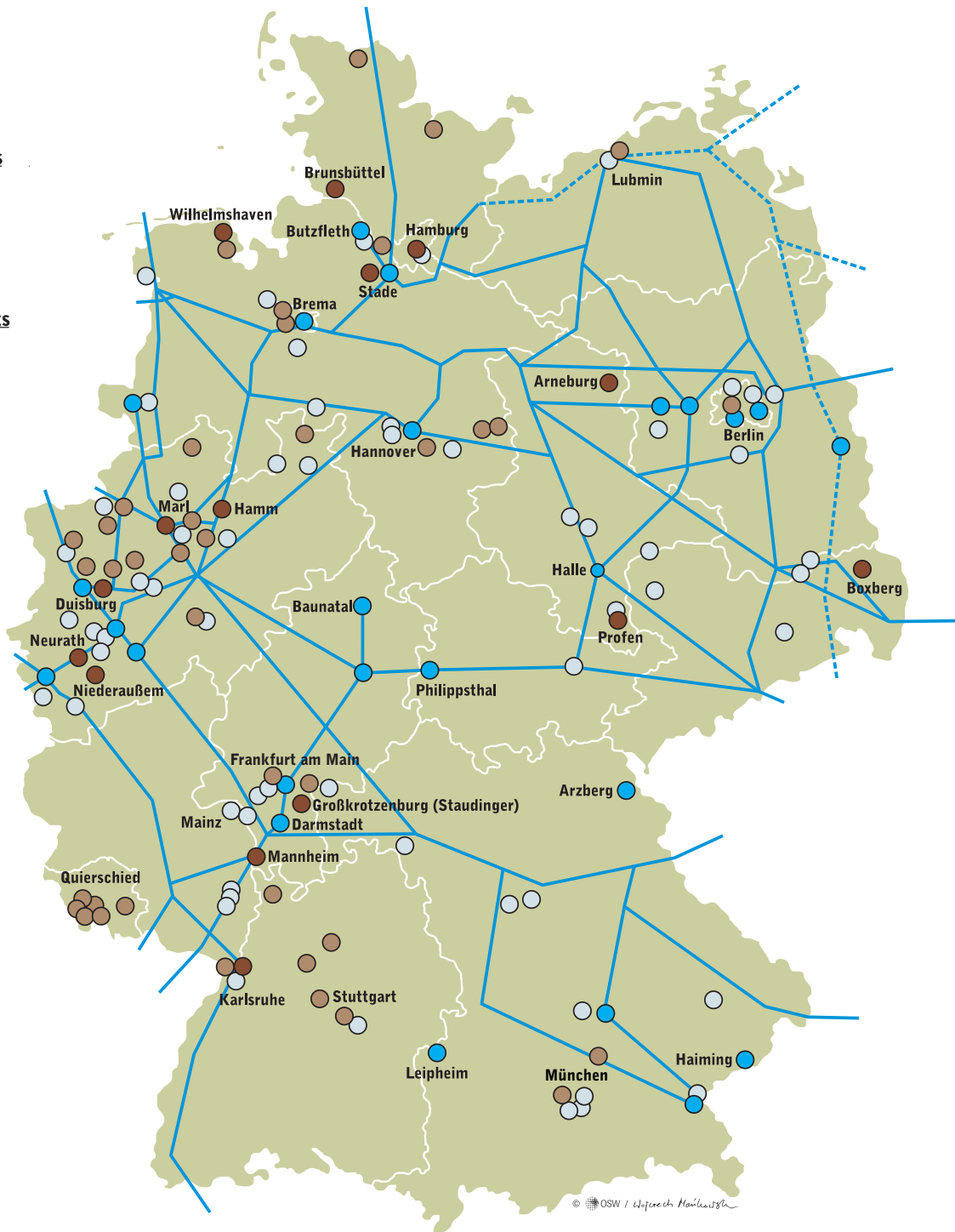
- existing
- - - planned

#### Gas power plants

- existing
- planned

#### Coal power plants

- existing
- planned

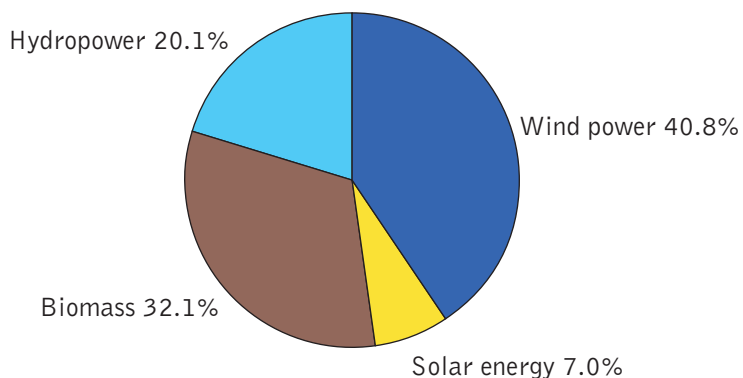


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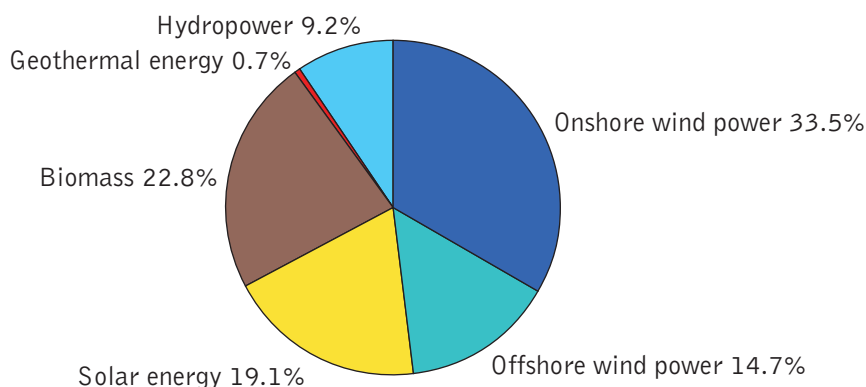
Sources: The German Ministry for the Economy; the German Association of Energy and Water Industries

## 2. The structure of power production from renewable energy sources in Germany in 2009 and a production forecast for 2020

### The structure of power production from renewable energy sources (2009)



### Forecast for power production from renewable energy sources (2020)



Source: the German Ministry for the Natural Environment



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