HEINRICH BÖLL STIFTUNG

Greening the Heartlands of Coal in Europe

Insights from a Czech-German-Polish Dialogue on Energy Issues

By Raffaele Piria (lead author and editor)
Co-authors: Aleksandra Arcipowska, Camilla Bausch,
Paul Hockenos, Sascha Müller-Kraenner and Jan Ondřich

February 2014

HEINRICH BÖLL STIFTUNG

Greening the Heartlands of Coal in Europe

Insights from a Czech-German-Polish Dialogue on Energy Issues

By Raffaele Piria (lead author and editor)
Co-authors: Aleksandra Arcipowska, Camilla Bausch,
Paul Hockenos, Sascha Müller-Kraenner and Jan Ondřich

February 2014

Greening the Heartlands of Coal in Europe
Insights from a Czech-German-Polish Dialogue on Energy Issues

Commissioned and published by the Heinrich-Böll-Stiftung

Lead author and editor: Raffaele Piria
Co-authors: Aleksandra Arcipowska, Camilla Bausch, Paul Hockenos, Sascha Müller-Kraenner, Jan Ondřich

Printed in the Czech Republic, 2014

English proofreading and language editing: Evan Mellander, Gwendolyn Albert

Layout and graphics: Hedvika Marešová
Cover picture: Michal Volf

This material is licensed under Creative Commons "Attribution-ShareAlike 3.0 Unported" (CC BY-SA 3.0).
For the licence agreement, see http://creativecommons.org/licenses/by-sa/3.0/legalcode,
and a summary (not a substitute) at http://creativecommons.org/licenses/by-sa/3.0/deed.en.

creative commons

This publication can be ordered at:

Heinrich-Böll-Stiftung, Opatovická 28, 110 00 Prague 1, Czech Republic
T +420 251 814 173 E info@cz.boell.org W www.cz.boell.org

Table of contents

Preface 5

About the authors 6

Members of the trilateral expert group 7

Summary and recommendations 8

Executive Summary 8

Recommendations 9

1. Comparative energy profiles and debates 11

1.1. Key energy indicators 11

1.2. Energy policy and outlook 19

2. Cross-border perceptions and information gaps 25

2.1. Energy policy debate and perception of the Energiewende in the Czech Republic 27

2.2. Between leadership and self-referentiality: Germany and the foreign policy dimension of the energy transition 28

2.3. Energy policy debate and perception of the Energiewende in Poland 29

3. Three core issues tackled in the trilateral dialogue 32

3.1. Electricity system and markets 32

3.2. The debate on the transit (loop) flows through Poland and the Czech Republic 38

3.3. Renewable energy support schemes 42

4. EU energy policy – integration, cooperation or isolation? 49

Annex: Facts about the German Energiewende (energy transition) 52

List of references 56

List of abbreviations 59

Preface

Germany's energy transition, or *Energiewende*, has been a success story thus far in terms of renewable electricity production (especially solar PV and onshore wind), technological innovation, job creation, and citizen involvement in clean-energy generation, among other areas. Yet there is room for improvement.

One weakness of the current layout of the *Energiewende* is that, for the most part, it focuses on the national level alone. The impacts of this transition on neighbouring countries have hardly been addressed in Germany. Conversely, some of Germany's European neighbours have called its nuclear phase-out into question. This is especially the case for Poland and the Czech Republic. At the same time, the energy transition is already having discernible effects on Germany's neighbours, especially on their grid stability and electricity markets, without there being adequate consultation and coordination mechanisms in place. While Polish and Czech politicians are concerned about the consequences of the German energy transition for their energy systems, German decision-makers are largely unaware of their misgivings. These gaps in information and communication give rise to misconceptions and political friction, often fed by misleading and sometimes populist media coverage.

One lesson to be drawn from Germany's *Energiewende* is that energy policy decisions taken in one EU member state affect other EU member states as well. For these reasons, the Heinrich Böll Foundation initiated a project entitled "The German Energy Transition in the European Context". The point of departure is the conviction that the energy transition can only be implemented successfully if it is firmly embedded in a broader European context. More European coordination and cooperation is needed to avoid conflict and to create win-win situations. The project's goals are to promote a deeper understanding of the challenges and opportunities created by Germany's energy transition, and to encourage a solution-oriented dialogue about its effects on other EU member states.

In 2013, the Heinrich Böll Foundation, in cooperation with Ecologic Institute, invited experts from the Czech Republic, Germany and Poland to discuss the prospects for better cross-border cooperation arising from Germany's energy transition. The expert group represented diverse professional backgrounds: academic research institutes and energy associations, civil society organisations and the political sphere. Despite this heterogeneity, the participants shared a common understanding that climate change and the risks associated with nuclear power require the expansion of renewable energy sources in all three countries, and that renewable sources and energy efficiency can provide a viable, sustainable alternative to nuclear power and coal. They responded to this initiative with acute interest, and during meetings in Prague, Warsaw and Berlin forged new networks and developed insights into and mutual understanding of country-specific as well as cross-border concerns and issues.

This report is the result of the trilateral expert group's discussions. We consider the process that led to this publication an extremely important step. The report outlines key observations made by the experts, and helps to identify key questions requiring further investigation. Even though the energy policy approaches of the Czech Republic, Germany and Poland differ, one must keep in mind that all three countries face the challenge of reducing their dependency on coal. We consider this common challenge an opportunity for enhanced cross-border dialogue and cooperation. By addressing the information gaps and core issues – such as electricity markets, loop flows and renewable energy support schemes – the report is an impulse for a deeper debate in future. The recommendations illustrate the importance of stronger collaboration where there are shared interests, which we would like to encourage.

It must be underscored, however, that not all of the meetings' participants share all of the report's recommendations. The report does not claim to be comprehensive, nor does it aspire to meet the scientific standards of a long-term research project. Rather, it is a compilation of under-reported information. It endeavours to inspire new ideas and provide direction for those who want to further the renewable and energy efficiency agenda in their respective countries and across borders.

We would like to express our gratitude to all the participants of the trilateral expert group for their commitment, and for the time and knowledge they have invested in the project. Special thanks are due to Camilla Bausch and Sascha Müller-Kraenner from Ecologic Institute for moderating the meetings. Finally, we would like to thank the lead author and editor, Raffaele Piria, and all the co-authors for their cooperation and highly valuable contributions to this report.

February 2014

Ralf Fücks, President, Heinrich Böll Foundation, Berlin
Eva van de Rakt, Director, Heinrich Böll Foundation, Prague
Irene Hahn-Fuhr, Director, Heinrich Böll Foundation, Warsaw

About the authors

Aleksandra Arcipowska
Aleksandra Arcipowska is an energy and climate expert, currently working for the Buildings Performance Institute Europe. She has worked on energy and climate-related projects for Polish institutes such as the Institute for Sustainable Development, the Institute for Renewable Energy, the Polish Climate Coalition, and the Polish Ecological Club. As a policy officer and researcher, she has been involved in various topics ranging from UNFCCC negotiations to energy-system transition. Aleksandra Arcipowska graduated from the Warsaw University of Technology, where she is currently finalising her PhD thesis on a low-carbon energy future for Poland (2050 energy scenarios) and the strategic decision-making process. She conducted her research at the Wuppertal Institute for Climate, Energy and Environment, where she worked as a DBU fellow.

Camilla Bausch
Camilla Bausch works in the senior management and as a Senior Fellow at Ecologic Institute. In her research work, she focuses on international climate negotiations, emissions trading and the improvement of energy policies and laws. Trained as a lawyer, she has a strong background in legal and institutional analysis, complemented by more than a decade of experience working in interdisciplinary and international settings. Dr Camilla Bausch is Associate Editor of the journal *CCLR - Carbon & Climate Law Review*. Her PhD thesis analysed grid access regulations in the liberalised electricity market of the European Union.

Paul Hockenos
Paul Hockenos is a Berlin-based, U.S. American writer. He is Germany and Central Europe Correspondent for *European Energy Review*. His work on Germany, Central Europe and the Balkans has appeared in *The New York Times*, *Newsweek*, *Foreign Policy*, *Die Tageszeitung*, *The Chronicle of Higher Education*, *The Nation*, *The Progressive*, *Spiegel International* and many other publications. His is the author of three major books on European politics and served in the post-war civilian administrations in Bosnia and Herzegovina and Kosovo. He has held fellowships at the American Academy in Berlin, the European Journalism College, the Carnegie Endowment for International Peace and the German Marshall Fund of the U.S.

Sascha Müller-Kraenner
Sascha Müller-Kraenner is a founding partner of Ecologic Institute, a global environmental think tank with a presence in Europe and North America. He is also the Regional Managing Director of The Nature Conservancy, a leading global conservation organisation, in Europe. Sascha Müller-Kraenner has published widely on energy and climate policy, as well as on European integration. His latest book, *Energy Security*, was published in German, English and Polish.

Jan Ondřich
Jan Ondřich is a partner at Candole Partners responsible for the company's analytical work. He advises both financial and strategic investors on regulatory and market risk to their returns on investment in Central and South-Eastern Europe. He is an expert on utilities, energy and the financial services sector, and is widely cited in the local and international business media. Jan Ondřich holds an MSc from the London School of Economics and Political Science.

Raffaele Piria
Raffaele Piria is an independent energy policy expert. He has over 14 years of energy policy experience in politics, trade associations, a company, a policy consulting institute and a think tank. He has broad expertise on energy policy issues at the European level, including economic, technical, legal and political issues. Raffaele Piria is fluent in English, German and Italian, and can work in French and Spanish. Skilled in strategy, analysis, moderation, communication and advocacy, he works only on projects compatible with his personal commitment to a sustainable energy supply.

The authors would like to thank Anna Pobłocka (eclareon) for her work on the Poland section.

Members of the trilateral expert group

All members of the trilateral expert group provided very valuable input to this report. However, the responsibility for this report lies only with the authors.

The following experts participated in the meetings of the trilateral expert group from May to October 2013. Not all views expressed in this report necessarily reflect the opinion of these experts or the institutions they were affiliated with as of October 2013:

Aleksandra Arcipowska, energy expert, Poland
Rainer Baake, Agora Energiewende, Germany
Martin Bursík, Chamber of Renewable Sources of Energy, Czech Republic
Oldag Caspar, Germanwatch, Germany
Severin Fischer, German Institute for International and Security Affairs, Germany
Jiří Jeřábek, Greenpeace CEE, Czech Republic
Zbigniew Karaczun, University of Warsaw, Poland
Andrzej Kassenberg, Institute for Sustainable Development, Poland
Katarzyna Michalowska-Knap, Institute for Renewable Energy, Poland
Charlotte Loreck, Öko-Institut, Germany
Lutz Mez, Free University of Berlin, Germany
Jan Ondřich, Candole Partners, Czech Republic
Raffaele Piria, energy policy expert, Germany
Markus Steigenberger, Agora Energiewende, Germany
Klára Sutlovičová, Greenpeace Czech Republic, Czech Republic
Wojciech Szymalski, Institute for Sustainable Development, Poland
Paul Wilczek, EWEA - The European Wind Energy Association, Brussels
Michał Wilczyński, energy consultant, Poland
Grzegorz Wisniewski, Institute for Renewable Energy, Poland

Summary and recommendations

Executive Summary

This report consists of four chapters and one annex.

Chapter 1 - "Comparative energy profiles and debates" analyses and compares various indicators, pointing to the differences between and similarities among the Czech Republic, Germany and Poland.

The **Czech Republic** (CZ), with its long history of technical and scientific excellence, boasts the fourth-highest share of solar-generated electricity consumption in Europe, after Italy, Germany and Spain. However, it also has the fourth-highest energy consumption per GDP unit, after Bulgaria, Estonia and Romania. Moreover, CZ has one of Europe's highest rates of market concentration in the energy sector.

In the region, **Germany** (DE) is out in front in terms of renewables deployment, and has lowered its emissions and energy consumption per GDP unit more significantly than have its eastern neighbours. However, DE has higher CO_2 emissions per head than Poland, and its final energy consumption per head in the residential and road transport sectors is higher than in CZ or PL, and also higher than the EU average.

Poland's (PL) energy consumption per person is lower than the EU average, and much lower than in CZ and DE. However, PL has the highest CO_2 emissions per GDP unit among the three countries, mainly due to coal use. What many observers do not know: PL became a net importer of hard coal in 2012.

A striking similarity between the three countries is their high reliance on coal. CZ, DE and PL are **the heartlands of coal in Europe**: with just 26% of the entire EU population, these three countries produce 79% of the hard coal, 68% of the lignite (brown coal), and 55% of the electricity generated from coal in the EU.

The three countries have very different official strategies to address their reliance on coal. CZ intends to replace a large part of its coal with new nuclear power plants. As argued below, this is unlikely to materialise. Germany's long-term climate goals are not reachable without a long-term phase-out of coal, unless Carbon Capture and Storage (CCS) is widely deployed, which the authors consider very unlikely. However, in the last two years coal power generation has increased in DE. PL plans to rely on coal in the long-term as well, but its coal imports are increasing, while the subsidies required to maintain its own production are increasingly controversial and opposition to opening new brown-coal mining sites is mounting.

Accelerating the replacement of coal with less climate-intensive solutions and dealing with its environmental and social legacies is a key common challenge faced by these three Central European countries. In this endeavour, collaboration and the sharing of experience could be very useful.

At first glance, the situation with nuclear seems very different: CZ is in the process of tendering two new reactors; DE is rapidly phasing out nuclear; and, officially, PL is preparing to launch a new nuclear programme, after its first attempt in the 1980s stalled. However, **the nuclear prospects of the three countries are more similar than they might seem**. As discussed in Chapter 1, there are sound economic, legal, and political reasons to doubt that new nuclear plants will be built in CZ and PL in the foreseeable future. Even if, against all odds, all three planned reactors officially scheduled for 2025 in CZ and PL were to be built on schedule, by then the total nuclear capacity in operation in the three countries would have decreased from about 16 GW currently to less than 7 GW in 2025; 1.8 GW of this capacity will come from the four Soviet-designed Czech reactors, which by then will be 40 years old.

Therefore, considering their costs, potential capacities, and environmental sustainability, renewables and energy efficiency are not only a convenient large-scale alternative to dependency on coal, but are also the most compelling and viable long-term strategy for a sustainable energy supply in this region and elsewhere.

Chapter 2 - "Cross-border perceptions and information gaps" describes some key aspects of the debates within the three countries, paying particular attention to their relationships to one another. While Chapter 1 builds on a broad set of statistical data, Chapter 2 is largely based on information and impressions obtained in the course of the trilateral dialogue and from media debates. Admittedly of an anecdotal nature, it aims to offer a good introduction to some key aspects of the energy-policy debates. This chapter includes quotations from various opinion makers and media.

Chapter 3 covers the three core issues tackled in the trilateral dialogue. The first section describes and discusses key trends in the countries' electricity systems and markets. The second section examines the debate around the so-called "loop flows" or "transit flows" of electricity *en route* from northern DE to Austria or southern DE via PL and CZ. It aims at explaining this debate to non-specialists, and outlines some possible solutions. The third section looks at renewable-electricity support schemes in the three countries.

Chapter 4 - "EU energy policy – integration, cooperation or isolation?" embeds the Czech-German-Polish debate and cross-border issues in the broader European framework. This context is a complicated patchwork of shared governance that includes strong elements of national governance, important elements of shared governance at the EU level, and specific elements governed bilaterally or at the macro-regional level. It also outlines the positioning of the three countries in the debate over the EU 2030 climate and energy policy framework.

Finally, the **Annex of facts about the *Energiewende*** provides information refuting some of the most common misperceptions about the German energy transition which are prevalent in CZ, PL and other countries identified during the trilateral dialogue.

Recommendations

The trilateral dialogue did not aim to develop a coherent set of activities or political measures. Nevertheless, it has produced a set of ideas and recommendations addressed to those interested in cross-border dialogue – including government, civil society and business – in order to promote a more sustainable energy supply in this region. While the workshop series was not designed to address all the ideas in depth, the list below identifies those points that should either be directly addressed or should be explored in greater detail to address pressing problems.

Stronger collaboration on the shared interests relevant for all three countries, for instance:

- Exchange of experience and best practices at the local and national level in the area of energy efficiency. This is the cheapest, most wide-ranging way of improving energy supply security and competitiveness.

- Making the power system more flexible by strengthening and expanding distribution and transmission grids, demand response, flexible generation capacities (like hydro, biomass and gas power plants) and storage. More flexibility on the German side will reduce the problem of unwanted transit flows affecting PL and CZ. More flexibility in the latter two countries will enable their consumers to benefit from the growing volume of wind power and solar electricity.

- Development of the grid infrastructure necessary to integrate growing amounts of renewables.

- Improving collaboration between transmission system operators, regulators and civil society in the three countries to facilitate power-grid planning and construction in order to remove bottlenecks, both domestically and at the interconnection points. Costs-and- benefits-sharing agreements for infrastructure beneficial to more than one country should be considered, including the future addition of further key infrastructure projects in this region to EU funding priorities.

- Regarding the loop flows, neighbouring countries' concerns must be considered seriously. On the German side, accelerated deployment of domestic flexibility sources (first and foremost the north-south grid reinforcement, but also, for instance, demand response or other flexibilities in the northeast of Germany) and further consideration of the proposal to split the German/Austrian market into two zones. If this is not possible for domestic (German) political reasons, Germany should consider sharing the costs of the burden with its neighbours. On the Polish and on the Czech sides, a serious debate should be opened about the advantages of a rapid flexibilisation of their own power systems, which would transform the unwanted flows into an opportunity for Czech and Polish consumers to benefit from cheap wind and solar energy from Germany. Moreover, a flow-based market could be considered.

- Cross-border learning in addressing the technical, environmental and social challenges that accompany the decommissioning of brown-coal and hard-coal mining sites.

- All three countries could consider establishing a bilateral or even a trilateral office for renewable energy cooperation along the lines of the German-French Bureau for Renewable Energies (DFBEE),[1] which could, among other responsibilities, encourage know-how transfer and cross-border investment in renewable energy.

Capacity-building and civil society dialogue:

- Capacity-building for relevant actors (government offices, public agencies, NGOs, renewable energy businesses and others) in the three countries with the goal of improving mutual understanding and building greater awareness of the foreign policy dimension of the *Energiewende*.

- Capacity-building for Czech and Polish civil society organisations to improve their understanding of the technical and political aspects of Europe's energy transition, including developments in Germany.

- A "demystification" initiative would be desirable, the purpose of which would be to counteract – with facts, figures and solid arguments – the negative and often factually flawed press reports about renewables and about the German *Energiewende* in the Czech and Polish media. An information campaign about renewables would involve experts and best practice examples, speakers and practitioners from various countries with strong renewables development such as Denmark, Germany, Spain, Ireland or Italy.

- Promotion of cross-border partnerships (or twinning) between municipalities and local initiatives interested in energy efficiency and renewables. In PL and CZ, many local administrators and civil society actors appear genuinely interested in the potential of small-scale, renewable-energy generation. Therefore, enhancing cross-border communication between local governments, civil society actors and small businesses might help link enthusiasm for renewables and energy efficiency in PL and CZ on the one hand with energy-progressive communities in Germany on the other. Mutual learning can be supported by highlighting concrete options for action and means of implementation.

- In the immediate future, civil society organisations promoting a clean energy transition in all three countries should focus on influencing the positions of their respective governments on the EU 2030 energy and climate policy framework, thereby promoting separate, ambitious and binding targets for climate emissions, for renewables and for energy efficiency. Also extremely important is the approval of effective measures to revitalise the emission trading scheme (EU ETS). Civil society can play a key role in all three countries: in DE, by encouraging the German government to become involved in a positive and proactive manner, and in PL and CZ by softening the opposition of their respective governments.

1 See http://enr-ee.com/.

1. Comparative energy profiles and debates

The first part of this chapter provides a comparative overview of some key energy indicators in these three countries as compared to the EU average. The second part describes the energy policy debates and strategies in the three countries.

1.1. Key energy indicators

Misperceptions often lurk behind cross-border misunderstandings. A comparative look at the facts can help address some preconceptions about the differences and similarities among the countries in this study.

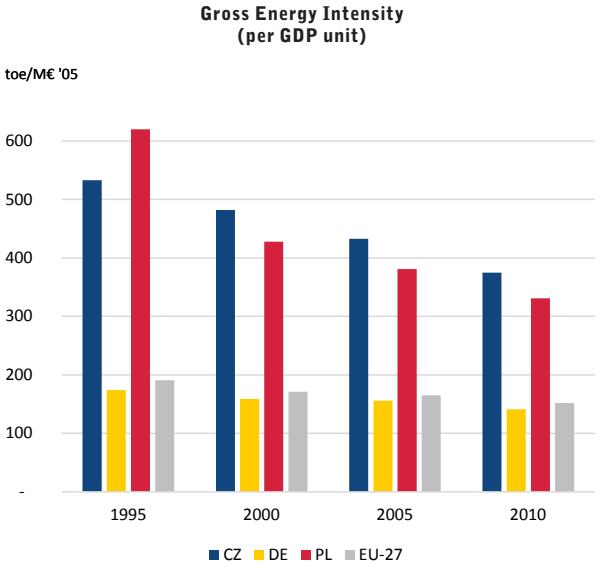
The greatest common denominator is the use of coal: these three countries constitute strongholds of coal in Europe. What was an asset in the 19th century is a liability in the 21st. Sharing experience about how to deal with coal is in the interest of all three countries.

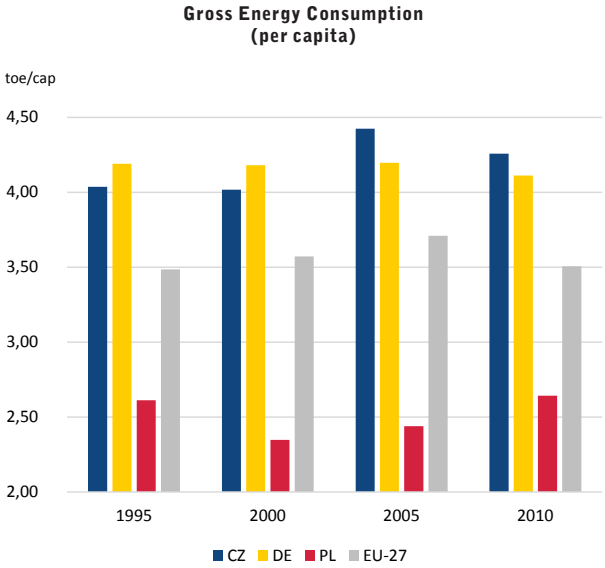
A look at the data also reveals some interesting surprises. How many Germans know that Germany's CO_2 emissions per head are significantly higher than Poland's? How many Poles know that PL has recently become a net importer of hard coal? How many Czechs know that their country's energy consumption per GDP unit is the fourth-worst (after Bulgaria, Estonia, Romania) in Europe, including the EU-28, the EFTA countries and Turkey?

Energy consumption

Looking at gross domestic energy consumption per head, both CZ and DE are substantially above the EU average, while PL is significantly below it. From 1995 to 2010, consumption per head increased by 6% in CZ, by 1% in PL and by 1% on average in the EU, while it decreased by 1% in DE.

As for energy intensity (i.e. energy consumption per GDP unit), there have been huge improvements in CZ and even more so in PL. However, both countries are still more than twice as energy-intensive as the EU average. Also, DE has significantly reduced its energy intensity, slightly increasing its relative advantage compared to the EU average.





Source: Eurostat database, 2013 (both refer to gross inland energy consumption).

A number of factors determine these indicators. Partly they are a consequence of a society's economic structure. Countries with energy-intensive industries obviously consume more energy than others specialised in services or less energy-intensive manufacturing. CZ, PL and eastern Germany were part of the Soviet bloc. This entire region experienced a strong reduction in energy consumption during the 1990s because of the closure or refurbishment of inefficient industrial processes and infrastructure.

On the other hand, high consumption per GDP unit can be a symptom of inefficient industries or infrastructure, and high consumption per head can be a consequence of unsustainable consumer behaviour. The massive increase in individual transport has been a main driver of energy consumption. In Germany and other wealthy countries, improvements in the energy performance of buildings have often been outweighed by increases in the heated surface area per head as people live in larger homes and work in bigger offices.

The charts above show that CZ and PL still have immense potential for increasing their energy productivity. At the same time, Germany, too, must endeavour to bring down its energy consumption per head and approach the EU average.

Energy consumption by sector

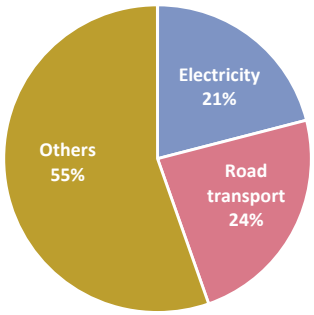
This report mainly focuses on the electricity sector, reflecting the intensity of the discussion in the trilateral expert group and in the energy policy debate in general. However, as the chart on the right shows, electricity constitutes only a fraction of total energy consumption.

Producing electricity with nuclear and coal plants is a very inefficient process. Nearly two-thirds of the primary energy contained in the fuel is lost as waste heat, unless it can be used for heat supply (cogeneration). The primary energy consumption, therefore, is much larger than the final energy consumption. (The latter refers to the energy that is actually used.)

Looking at final energy consumption, **electricity makes up only 21% of the total** in the three countries, each of them with similar levels.

Most of the "other" 55% is used for heating: space heating, domestic hot water and industrial heat.

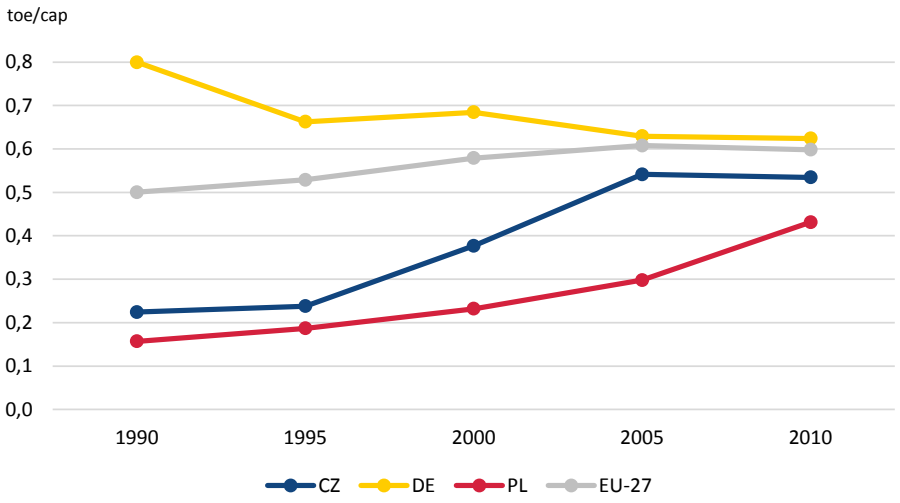
Final Energy Consumption by sector (CZ+DE+PL)



Sources: Eurostat database 2013 and data provided by ENTSO-E.

Road transport alone comprises 24% of the EU's final energy consumption. At the EU level, the road transport sector registered the highest (+150 mt CO_2 equivalent) increase of greenhouse gas emissions from 1990 to 2011.[2]

Final Energy Consumption - Road Transport(per capita)



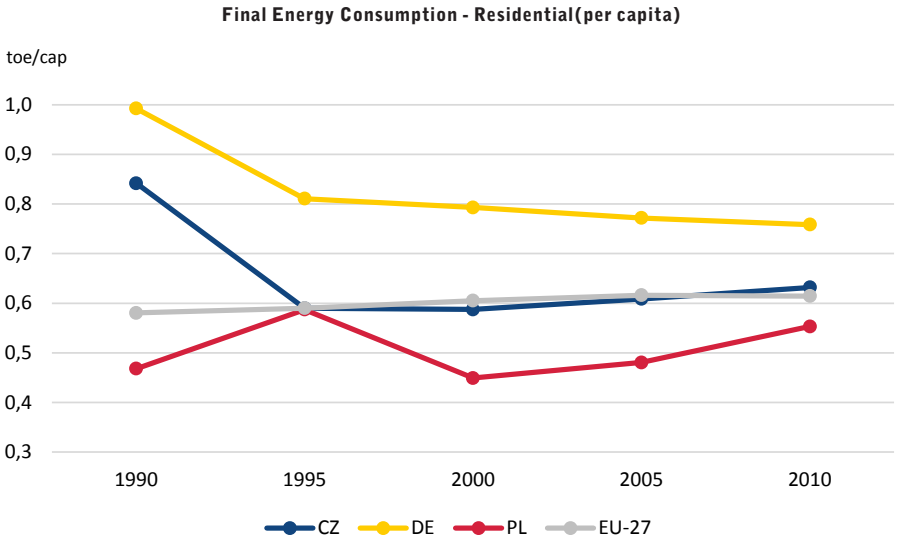
Source: Eurostat database, 2013.

2 Greenhouse gas emission trends (CSI 010/CLIM 050), European Environment Agency (2013).

Over the last fifteen years, CZ and PL have very nearly caught up with their EU peers in this regard. The result has been a strong increase in consumption per head. DE has consistently improved upon its transportation-related consumption levels, but its consumption per head is still larger than the EU average, and almost 50% more than in PL. This is the case despite Germany's favourable conditions in terms of population density and rates of urbanisation, which imply greater use of public transport.

A familiar problem is that the German car fleet is heavier and more energy-inefficient than the fleets of most other EU countries. Also, German car production focuses on higher-class and more energy-intensive vehicles. German car producers recently demonstrated once again their considerable political clout when, in late 2013, the conservative CDU-FDP coalition weakened the car emission standards agreed upon by the European Council.

In the **residential sector**, by far the largest share of consumption is devoted to space heating. Although winter temperatures are less severe in DE, citizens in DE consume 20% more energy per head than do citizens of CZ, and 37% more than in PL.



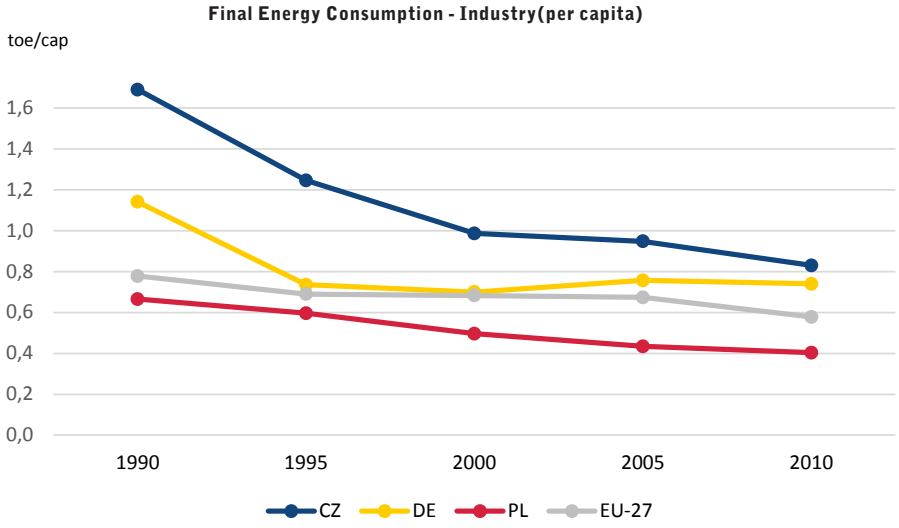
Source: Eurostat database, 2013.

A main reason for the difference is the higher penetration of district heating in CZ and PL.[3] Another main factor, however, is the size of the heated surface available per head, which is a result of living standards.

Improvements in the heating sector are essential in order to meet climate targets and to improve energy security and competitiveness. In all three countries, there is immense potential for increasing the energy performance of buildings, as well as the efficiency and the renewables share of the heating supply. This potential should be exploited as soon as possible, particularly in Germany, considering its particularly high consumption per head and its better economic conditions, which allow for a higher share of long-term investments.

3 District heating with cogeneration is much more energy efficient than the sum of individual heating systems and of electricity only power plants. In the chart above, this effect is amplified by the fact that the energy consumption for such cogeneration plants is not counted by Eurostat under the residential sector.

In **the industrial sector**, all three countries and the EU in general have registered a significant reduction in energy consumption over the last two decades. This trend was particularly strong in CZ.

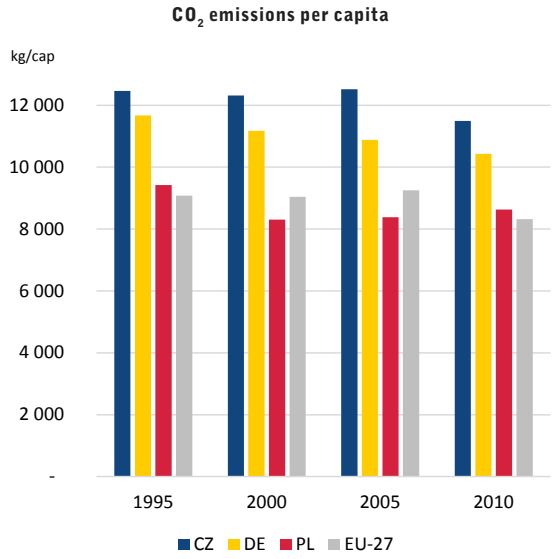


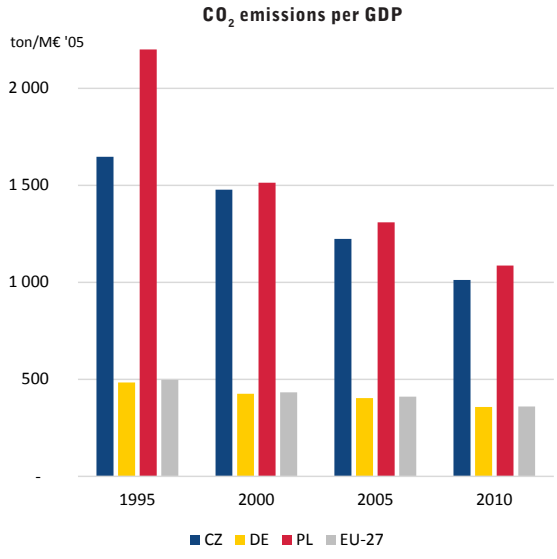
Source: Eurostat database, 2013.

Behind these data, there can be very different trends, ranging from efficiency improvements in industrial processes to changes in manufacturing portfolios, as well as losses or gains in industrial production. An analysis of these trends in the three countries is beyond the scope of this report.

Greenhouse gas emissions

In 2010, all three countries had higher CO_2 emissions per head than the EU average.





Source: Eurostat database, 2013.[4]

4 In the chart with the emissions per GDP unit, the GDP values are weighted by inflation, each year value corresponding to the real values of 2005.

As seen above, this is the result of the interaction between different sectors. PL's higher emissions per head in the electricity sector are outweighed by DE's higher emissions in other sectors. For Germany, and likewise for China and certain other countries, the argument can be made that an exporting nation with a strong manufacturing sector "imports GHG emissions" from the countries where its exported goods are consumed. However, only a relatively small portion of Germany's climate emissions is actually caused by the manufacturing sector; 42% of Germany's CO_2 emissions come from coal, most of which is burned in power plants. Moreover, as seen above, Germany's emissions per head are higher than the EU average in various sectors related to internal consumption. In these sectors, the scope for emissions reductions in Germany is huge, as it is in all three countries.

Looking at CO_2 emissions per GDP unit, DE is far more advanced than CZ and PL. Despite its strong manufacturing sector, Germany's CO_2 emissions per GDP unit are slightly below the EU average. PL reduced the carbon intensity of its economy by 51% from 1995 to 2011, almost reaching the level of CZ, which decreased its carbon intensity by 39% in the same period. Both countries remain among the most carbon-intensive in Europe, however.

In CZ, 44% of emissions stem from its energy supply. CZ met both its Kyoto target and the benchmark for emissions not covered by the EU ETS.[5] This looks more impressive than it really is, however: the Czech GHG emissions target (-8%) had already been more than achieved (roughly -25%) at the time it was set as a result of the post-communist economic transformation.[6] Our Czech experts note that the Kyoto Protocol never worked as an incentive to reduce GHG emissions in CZ. On the contrary, it was often abused as an excuse not to reduce emissions further. The argument went something like this: "We are in compliance with Kyoto while some other EU countries are not, so why should we take on additional targets?"[7] Indeed, CZ, in an effort to protect coal-dependent energy utilities, has opposed EU efforts for greater reductions in carbon emissions. Together with other Central European countries, it has won exemptions from the EU ETS.

Germany achieved its Kyoto target of reducing GHG emissions by 21% from 1990 to the period 2008-2012. This was partly due to the economic transformation in eastern Germany, but also because of a broad mix of policies implemented during the last fifteen years. Also, the pursuit of relatively ambitious climate targets in the longer term is strongly anchored in the political culture. As noted in previous sections, however, emissions per head are still high in several areas compared to the EU average, and a rich country like Germany should be able to do more. Areas of particular concern are the lack of a clear roadmap for the phase-out of brown coal and for emissions reductions in road transport – an area where the German government has actively interfered to water down European legislation strengthening efficiency standards.

According to an expert study, PL does not have a clearly defined, updated strategy for meeting short or long-term targets.[8] Nevertheless, PL met its Kyoto targets (2008-2012) and is on track to meet its non-ETS targets through domestic emissions reductions. As in the case of CZ, PL's target (-6% from 1988 to 2008-12) was not very ambitious, taking into account the -32% reduction that occurred in the 1998-2005 period, primarily as a result of the economic downturn during the post-communist transformation. Other measures also played a role, including the addition of renewable power capacity and some improvement in energy efficiency. The Polish government fiercely opposed recent efforts to reform and strengthen the EU ETS ("backloading").[9]

5 Eike Dreblow, Filip Jirouš et al.., "Assessment of Climate Change Policies in the Context of the European Semester. Country Report: Czech Republic", Ecologic Institute and eclareon, June 2013.

6 Summary of GHG Emissions for Czech Republic, United Nations Climate Change Secretariat.

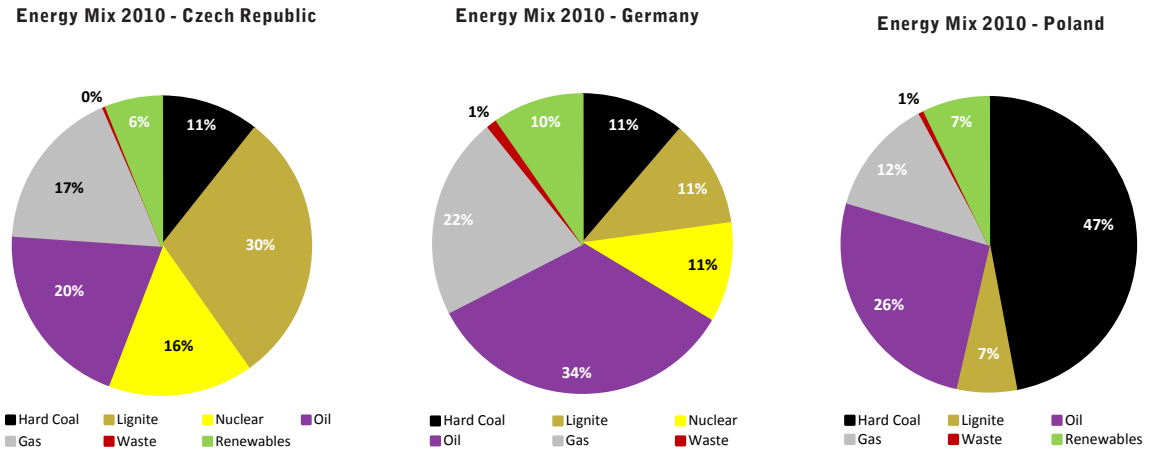
7 More information on EU member states' compliance with their Kyoto Protocol commitments can be found in a report of the European Environment Agency: Trends and projections in Europe 2013 – Tracking progress towards Europe's climate and energy targets until 2020, EEA report 10/2013, 49 ff.

8 Eike Dreblow, Filip Jirouš et al., "Assessment of Climate Change Policies in the Context of the European Semester. Country Report: Czech Republic", Ecologic Institute and eclareon, June 2013.

9 Jarosław Ćwiek-Karpowicz, Aleksandra Gawlikowska-Fyk and Kirsten Westphal, "German and Polish Energy Policies: Is Cooperation Possible?", PISM Policy Paper no. 49 (January 2013), 3. See also Michael Mehling, Camilla Bausch, Lena Donath and Elisabeth Zelljadt, "The Role of Law and Institutions in Shaping European Climate Policy", Ecologic Institute, 22 October 2013, 44.

Energy mix

The following charts show the shares of different energy sources in the gross domestic energy consumption of these three countries.



Source: Eurostat database, 2013.

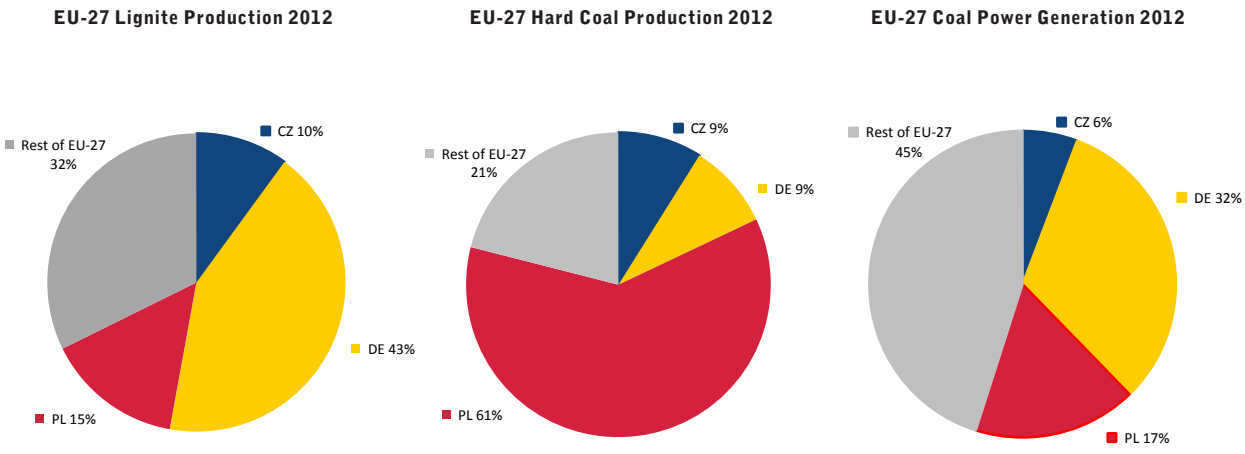
These charts show all energy uses, including heating and transport. The mix in the electricity sector is presented in a separate chapter below. The share of coal is very high in CZ (41%) and in PL (54%). Germany's share of oil is remarkably high, largely due to road transport and space heating.

In 2010, looking at all energy sectors (not only electricity), Germany's renewables share was not much larger than its neighbours'.

Poland relies on coal for 92% of its electricity and 55% of its primary energy supply.

Europe's coal heartlands

Indeed, significant production and consumption of coal is a main similarity between CZ, DE and PL. With just 26% of the EU population, the three countries account for 68% of the entire EU's lignite production, 79% of its hard coal production, and 54% of its electricity generated from coal.



Source: Euracoal data from 2013.

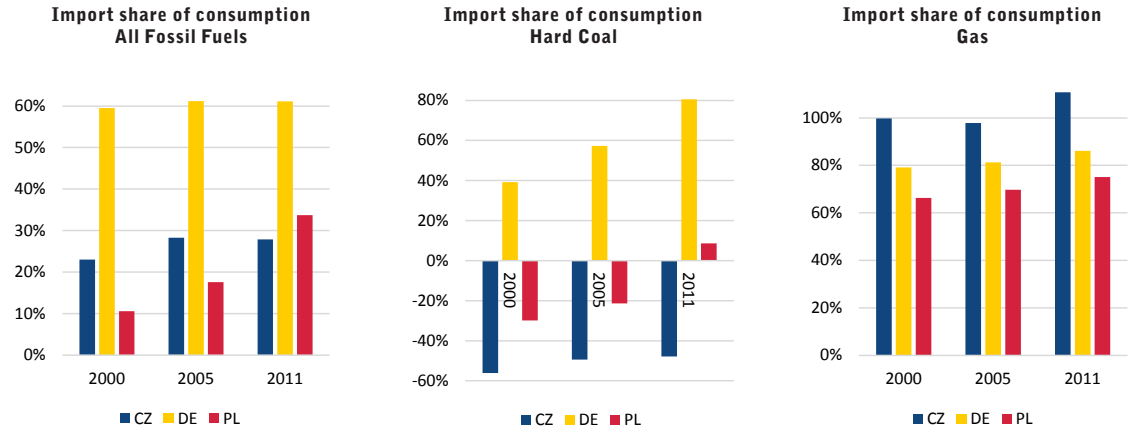
A number of coal power plants have been and will be forced out of the market by the EU Large Combustion Plant Directive and by the Industrial Emission Directive. This is because the costs of compliance are prohibitive for some, also in view of the decline in power market prices caused by cheap solar and wind power generation; 40% of Poland's coal burning plants are more than 40 years old,[10] often extremely inefficient and highly polluting. The huge Bełchatów lignite power plant in central PL has been called the largest carbon polluter in the EU. According to a study by the Energy Market Agency on behalf of the Ministry of Economy,[11] about half (13.7 GW) of the currently installed coal capacity will be phased out by 2030 in light of technical and environmental constraints. Thus, the highly political question of how such capacities should be replaced has to be answered in the near future and will impact Poland's production portfolio for the following decades.

Energy imports and exports

As for oil, all three countries are heavily import-dependent. This is reflected in the chart showing "All Fossil Fuels". Import dependency is also high for gas and is increasing in all three countries.

Curiously, the Eurostat statistics about "all fuels" energy imports do not include uranium. Therefore, the chart below is more precisely called "all fossil fuels". Although the European nuclear lobby constantly claims that nuclear energy would reduce Europe's dependency on energy imports, the reality is that just 2% of the uranium supplied to EU utilities in 2012 came from the EU.[12]

Reducing dependence on energy imports as well as reducing heavy subsidies and the environmental and social impacts linked to coal and uranium mining are strong arguments for renewables and energy efficiency in these three countries and elsewhere.



Source: Eurostat database, 2013.

CZ imports almost all of its petroleum products. The demand for crude oil is met mainly by Russia (over two-thirds) and Azerbaijan (over a quarter). CZ imports natural gas from Russia (63%), Norway (3%), and the European Union (34%).[13] As shown in the chart, Czech hard coal exports amount to about 50% of its domestic consumption. However, the value of the net foreign trade balance for hard coal was equal to just 0.3% of the Czech GDP in 2012.[14] This export

10 Grzegorz Wiśniewski, Katarzyna Michałowska-Knap and Grzegorz Kunikowski, "Ocena skutków ekonomicznych utrzymania wsparcia dla technologii współspalania węgla z biomasą", IEO – Institute for Renewable Energy, March 2013.

11 Ministry of Economy of Poland, Prognosis on fuel and energy demand until 2030 (update from 2011), Annex 2 to Energy Policy of Poland until 2030.

12 Euratom Supply Agency, Annual Report 2012.

13 "Ropa, ropné produkty a zemní plyn", Český statistický úřad, 11 March 2013.

14 Data from the Czech Ministry of Industry and Trade, see http://www.mpo.cz/dokument142156.html.

value might be more than outweighed by the heavy direct subsidies paid to the coal mining sector, also considering the global downward trend in hard coal prices and its environmental costs.[15] CZ is the only EU country still active in uranium mining. Uranium and radioactivity were discovered in what became Czechoslovakia,[16] which in the 1950s was the main provider of nuclear fuel for the entire Soviet bloc. This long history of uranium mining left a dreadful legacy of contamination in various sites around the country.[17] The only remaining mine was scheduled to be closed, but is still in operation today. Growing grassroots opposition has blocked the re-opening of other uranium mines, however.

In Germany, the goal of reducing dependency on energy imports has been an important driver for energy efficiency efforts and renewables deployment. Germany has almost no domestic oil and minor gas resources, but it does have very large coal reserves. In the late 1950s, more than 600,000 people were employed in hard coal mining.[18] By the 1960s, German hard coal had lost its competitiveness on the world market, but coal mining is still subsidised for social and political reasons. The subsidies are scheduled to terminate in 2018, putting an end to hard coal mining in Germany. Brown coal mining is still profitable, but very controversial, and not only because of its climate impact. According to a law approved in the 1930s, residents can be relocated to allow for expansion of huge surface mines in the name of the public interest. In December 2013, Germany's Constitutional Court confirmed this general principle, but strengthened the legal rights of residents as well. The companies exploiting the sites, and local authorities providing new authorisations, will find it increasingly difficult to argue that brown coal mining is in the public interest. Indeed, it is ever more widely accepted that Germany can be self-sufficient within decades through a mix of renewables and energy efficiency measures, with gas as a backup.

Germany's environmental movement was central to achieving a cross-party consensus on a nuclear phase-out. The next objective should be a roadmap for the phasing out of brown coal. The primary motivation should not be just climate protection, but also because a power system with large amounts of wind and solar requires flexible backup power plants, and brown coal plants are particularly inflexible. Nevertheless, phasing out brown coal will meet heavy opposition from regional economic interests as well as those electricity producers who rely on the high profit margin guaranteed by brown coal power plants. Therefore, while the fight against brown coal might require a comparable intensity of political engagement to that of the fight against nuclear in the past, the rapid growth and declining prices of renewables could accelerate it.

Poland imports all of its fossil fuels with the exception of some of its coal. Russia supplies 90% and 65% of PL's oil and gas,[19] respectively.[20] Despite its significant hard coal production, PL's import dependency has grown substantially over the last two decades. Recently, PL even became a net hard coal importer for the first time ever. Until 2010, its domestic coal production was heavily subsidised. Now, it is suffering as a result of competition in international markets. In 2011, coal imports were three times higher than original government estimates (15 Mton vs. 5 Mton), and domestic production was lower by 20% (76.54 Mton vs. 97.5 Mton).[21] Moreover, observers expect a further increase in Poland's net hard coal imports.

Renewable targets and deployment

Within the framework of the EU Renewables Directive, the three countries have adopted binding national targets for their shares of renewable energy in gross final energy consumption until 2020. Compared to the relative shares in the year of reference, the scale of their ambitions was different: DE set itself the target of tripling its renewable share from 6% to 18%; CZ set itself the target of more than doubling its share, from 6.1% to 13%, as did PL, from 7% to 15%. The chart below shows the progress from 2005 to 2011.

15 On subsidies for coal mining in CZ and neighbouring countries, see Daniel Bardsley, "Little Hope for Struggling Mine", Prague Post, 30 September 2013; IEEP et al., Reforming Environmentally Harmful Subsidies, Final report to the European Commission (2007); UNEP, Energy subsidies: Lessons Learned in Assessing their Impact and Designing Policy Reforms (2003).

16 The term "radioactivity" was coined by Marie Curie. Born in Warsaw, then part of the Russian Empire, as Maria Skłodowska, she became a French citizen but always maintained her Polish identity. For instance, she named polonium one of the elements she discovered. The other one, radium, was isolated from material that came from the mine of Jáchymov in the Czech Republic (then called Joachimstal, in the Austrian Empire).

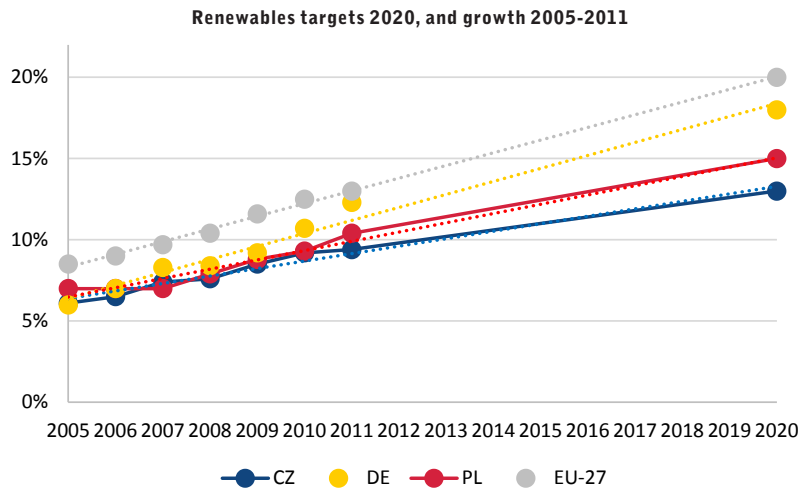
17 See, for instance, the documentation of the exhibition "Faces of uranium" organised by the NGO Calla.

18 See: http://kohlenstatistik.de/.

19 The LPG terminal in Świnoujście, with an annual capacity of 5bn m^3 will be opened in 2015. This politically driven project aims at diversifying the gas supply sources.

20 Jarosław Ćwiek-Karpowicz, Aleksandra Gawlikowska-Fyk and Kirsten Westphal, "German and Polish Energy Policies: Is Cooperation Possible?", PISM Policy Paper no. 49 (January 2013), 4.

21 Ministry of Economy of Poland, Realizacja Programu działalności górnictwa węgla kamiennego w Polsce w latach 2007-2013 (only in Polish), amended in 2013.



Source: Eurostat database, 2013; Directive EC 2009/28/EC, trend lines elaborated by the authors. [22]

To date, all three countries have registered growth in line with the 2020 targets. However, there are reasons to be concerned about the continuation of this positive trend.

1.2. Energy policy and outlook

Czech Republic

In 2013, the CZ government started the process of adopting a new long-term energy strategy, oriented to 2040. The process could not be completed because of the political crisis that led to new elections in October 2013. The 2013 draft underscores securing the energy supply and maintaining CZ's position as an exporter of electricity. Under the questionable assumption of continued growth in electricity demand, the government has maintained its stated intention of expanding nuclear generation. [23]

According to the 2013 draft energy strategy, nuclear energy should account for 49% to 58% of total electricity generation by 2040, compared with 35% in 2012. This assumes about 6 GW of nuclear power in operation in 2040, which would then be operated at close to full load (e.g. 90%). The 3.8 GW currently in operation will have an average age of 49 years in 2040.[24] According to this plan, the share of coal as a portion of total generation would drop from 57% in 2012 to 18% in 2040. No new coal plants are planned. The role of natural gas in electricity generation is expected to grow to provide backup and balancing power.

The Czech government and energy industry insist that nuclear is key to ensuring the country's energy security. ČEZ is currently running a tender to obtain offers to build two new reactors at its Temelín plant, each with a capacity of over 1,000 megawatts at a cost of around eight billion euros. The procedure leading to this tender started well before the Fukushima accident and before the massive delays and cost overruns of new nuclear plants in Finland, France and Slovakia became known, and there are a number of good reasons to doubt that these new reactors will be ready by around 2025, as planned – or indeed ever.[25]

22 The trend lines in the chart are deliberately set linearly, and do not follow the exponential growth trajectories indicated in the Renewables Directive. According to these, more than one-third of the total growth over fifteen years would occur in the last two years, which is clearly not realistic. For this reason, any suggestion that meeting the intermediate trajectory targets would be sufficient is of doubtful value if it is not accompanied by an explanation of how the massive growth should be implemented during the final years of the decade. Even by the less-relaxed linear trajectory, however, the three countries are so far on schedule.

23 "Aktualizace Státní energetické koncepce České republiky", Czech Ministry of Industry and Trade, September 2013.

24 Mycle Schneider and Antony Froggatt, World Nuclear Industry Status Report 2012.

25 Ivan Kotev, "Temelinomics", Candole Partners, (2012) and Georgi Vukov, "Temelinomics 2", Candole Partners, (2013)

ČEZ, once the main promoter of the project, is now asking for public aid similar to that announced by the British government for the new nuclear plants in the UK.[26] In January 2014, ČEZ's CEO, Daniel Beneš, said that he "cannot imagine signing a fully effective Temelín contract until a contract for difference or other model is assured for financing the expansion". On the same day, the future Minister of Industry and Trade in the new government, Jan Mládek, said he favours postponing the construction of the new reactors in Temelín.[27] In fact, though, it seems increasingly unlikely that the Czech Parliament would authorise subsidies on a scale comparable to those negotiated by the British government with EDF. One must take into account, for example, that the economic business case for new nuclear power capacity has become even bleaker with the substantial decrease of electricity prices in Central Europe (see Chapter 4). Moreover, it is not at all clear that the European Commission would consider such a deal compatible with EU competition law, considering the overcapacities in the generation market in Central Europe.

Even if all of the political and legal obstacles were overcome, it seems very doubtful that the project could attract adequate financing. The big question is who would take the risk. Several years ago, analysts deemed ČEZ not creditworthy for such a project, and its economic situation has worsened since.[28] The Czech state has a good credit rating, but its credibility in energy policy has been heavily undermined by its retroactive changes to the renewable energy support schemes. Investors might wonder about the credibility of such a commitment for billions of euros over 30 to 40 years since the trust of those who invested in renewables was broken in less than two years. At the same time, the British experience shows that there are very few companies prepared to embark on such a project and bear the construction risk. Finally, decades of experience in many countries[29] shows that even when the investment decision for a new nuclear plant has been taken, the likelihood of long delays is high, as is the possibility of the project being halted.

Thus, the likelihood that these planned nuclear plants will be built in the foreseeable future is quite low. Nevertheless, the trilateral dialogue has suggested that the nuclear lobby is powerful when it comes to the country's energy discourse. The nuclear lobby's rhetoric effectively paralyses innovation and alternative investments. As long as large parts of the establishment insist that the future is nuclear, the political and intellectual space for renewables and energy efficiency will remain very limited.

In this context, at the EU level the Czech electricity establishment is interested in measures supporting wholesale electricity prices and the profitability of its baseload power plants (e.g. reducing and possibly ending policies that support renewables, as well as a framework suitable for the introduction of capacity payments benefiting existing and future plants). As for CO_2 prices, there are conflicting interests: the nuclear sector is interested in reforming the EU ETS to establish meaningful CO_2 prices which would increase revenues for existing nuclear plants and make the business case for new reactors less implausible, but, unsurprisingly, the Czech brown coal lobby does not support higher CO_2 prices. The former President of the Czech Republic, Václav Klaus, is known globally as a climate change denier, and this legacy still has an impact today on the Czech public discourse on climate change and the energy future.

The Czech incumbents and the energy establishment have little interest in the further deployment of renewables in CZ or in neighbouring countries. Therefore, it will be challenging to obtain their support for possible EU-wide 2030 renewable targets.

Germany

In the year 2000, the German government, at that time led by the Social Democrats (SPD) and the Green Party (Bündnis 90/Die Grünen), announced its intention to phase out nuclear power. Legislation mandating the terms of the process was enacted in 2002.

In 2010, however, the centre-right government led by the Christian Democrats (CDU/CSU) and the Liberals prolonged the lifetime of Germany's nuclear power plants. Even before the 2011 Fukushima accident, the unpopularity of this step was clear. After the accident, Chancellor Angela Merkel reversed her administration's position and embraced a nuclear phase-out policy even more ambitious than that of 2002. As the nuclear phase-out has now been supported by all of the main parties represented in the German Parliament, there is no longer a debate in Germany about the future of nuclear power.

---

26 "Brusel chce pos Jan uzovat podporu pro jádro jednotlivě. ČEZ se nevzdává", *E15*, 11 October 2013.

27 Both statements reported in *The Fleet Sheet* N° 5528, Prague, 8 January 2014.

28 Ivan Kotev, "Temelinomics", Candole Partners, (2012) and Georgi Vukov, "Temelinomics 2", Candole Partners, (2013).

29 Mycle Schneider and Antony Froggatt, World Nuclear Industry Status Report 2012.

Compared with the two drastic turnarounds during the previous legislature, the new CDU/CSU-SPD coalition government elected in 2013 is likely to be one of relative continuity, bringing the *Energiewende* (energy transition) forward, albeit at a slower pace than is either possible or desirable.

In its coalition agreement the new government underscores that Germany is solidly on the way towards further strong growth in renewables and greater energy efficiency, while staying on track with the nuclear phase-out. Long-term goals for the reduction of greenhouse gas emissions (-40% by 2020, -80% to -95% by 2050) have been confirmed. The corridors of a 40-45% renewable electricity share by 2025 and a 55-60% share by 2035 is basically in line with the 2020-30-40 corridors of the 2011 energy concept. While energy-progressive actors had asked for even higher ambitions in the light of the considerable progress achieved so far, the coalition agreement is still a clear commitment to the further strong deployment of renewables. For offshore wind, however, the ambition has been reduced compared to previous plans, considering its current challenges and the slow pace of its expansion so far.[30] As the overall ambition for renewable electricity expansions prevails, however, this might push expansion of onshore renewables.

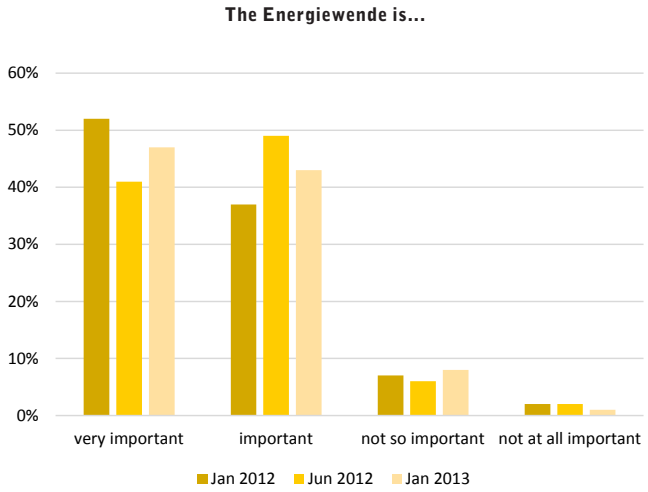
According to the coalition agreement, the reformed support scheme should be compatible with the continued deployment of onshore wind, offshore wind and solar PV, among others. As of this writing, the envisaged reform of renewable electricity has not yet been published and can therefore not be commented on here.[31]

What remains open is the outcome of the debate about policies to guarantee that sufficient electricity generation capacity remains available for the hours and weeks when renewable generation is low. There is a risk that such a policy might be designed in such a way so as to help coal power plants remain online, although a number of other sources can also provide balancing capacity, including demand response, hydropower stations, storage, and less-polluting gas power plants.

The new government intends to adopt a National Action Plan for Energy Efficiency in 2014, which should become the second pillar of the *Energiewende*. It remains committed to the ambitious goal of achieving 25% of electricity from cogeneration by 2020, favouring the expansion of efficient district heating systems. It will also increase the budget of the investment grants and soft loans provided by the public bank KfW for energy efficiency measures in buildings.

As for the foreign policy dimension of energy and climate policy, the new government announced its intention to work at the EU level for the adoption of a target of a 40% GHG emissions reduction by 2030 as one element of a triad of 2030 targets, including EU renewables and energy efficiency targets. It is also aware of the need to strengthen the power grid connections and increase collaboration with neighbouring countries.

It remains to be seen how the declared intentions will be implemented. The best guarantee against the risk of underperformance is the remarkable public support for the *Energiewende* in Germany. Despite emotional debates in the media over the last two years, 90% of the population (see chart below) consistently consider the *Energiewende* "important" or "very important". A clear majority are still prepared to pay more to ensure the rapid deployment of renewables.



Opinion survey of a representative sample of the German population. Source: BDEW.[32]

30 6.5 GW offshore wind until 2020 instead of 10 GW as foreseen in the old Energy Concept and the National Renewable Energy Action Plan (NREAP), and 15 GW for 2030 instead of 25 GW.

31 This text reflects the state of debate at the end of December 2013.

32 Source: BDEW -Energiemonitor 2013: Das Meinungsbild der Bevölkerung.

Poland: Energy policies and outlook

Energy security is the guiding principle of Polish energy policy. PL addresses its concerns about energy security with a two-pronged strategy: diversification of energy supply and reduction of energy imports from Russia.[33]

The latest energy policy strategy of the Polish government was adopted in 2009.[34] A revised version[35] should be adopted in 2014. According to both, electricity production should shift gradually from partly-imported coal towards a more diverse mix including nuclear, unconventional gas and renewables. The official scenarios are based on the assumption that the primary energy and electricity demand will increase by 21% and 43%, respectively, from 2009 to 2030. To meet this demand, the power generation capacity would need to grow from 35 GW in 2010 to over 38 GW in 2020 and to 47 GW in 2030.[36] Moreover, the Ministry of Economy has warned that there is a risk of power shortages in the years 2016-17, because of the age of existing power plants that will have to be modernised or closed, and the lack of new investments in the power production system.[37]

Currently, one new coal power plant of about 1 GW capacity is under construction in Wola. There are plans to open several more in the medium term. Prime Minister Donald Tusk insists that PL will keep domestic coal as its main energy source. However, political declarations and economic realities may diverge. In the past, hard coal mining in PL was highly subsidised. The subsidies have recently been substantially scaled back, not least as a result of EU pressure.

However, another key factor is that this Polish hard coal production costs up to 50% more than in the U.S., Russia or Australia. In 2012, PL became a net hard coal importer. In the long run, this is likely to change the public's attitude concerning coal. In the meantime, the largest coal producer, Kompania Węglowa, is close to bankruptcy. According to expert forecasts, maximum output in 2050 will be about 28 million tonnes, i.e. roughly 65% less than today.[38] In 2011, the Supreme Audit Office published a report on the security of the domestic coal supply.[39] The main conclusion was that hard coal is produced inefficiently and that significant amounts of natural resources are lost in order to maximise short-term profits.

There is disagreement over how long PL can rely on its coal reserves. As for brown coal, local opposition to it is mounting. Moreover, critical experts estimate that in 30 years all cost- effective lignite reserves and most of the profitable hard coal deposits will have been exhausted.[40] Yet brown coal producers claim the country's reserves will "last" for hundreds of years.[41]

PL had hoped to become Europe's main producer of shale gas, but in 2012 generous estimates of its shale gas reserves were scaled back dramatically. [42] Potential shale investors including Exxon Mobil, Marathon Oil, Talisman Energy and ENI have since left PL,[43] although this departure was also for fiscal reasons. Nevertheless, research into exploiting unconventional gas opportunities continues, as does the formulation of legislation to make it possible.

PL has no nuclear reactors. According to the World Nuclear Association, "the Polish cabinet decided early in 2005 that […] the country should move immediately to introduce nuclear power, so that an initial plant might be operating soon after 2020."[44] Currently, the most optimistic (and unrealistic) official assumptions are for the start of operation in 2024.

---

33 Jarosław Ćwiek-Karpowicz, Aleksandra Gawlikowska-Fyk and Kirsten Westphal, "German and Polish Energy Policies: Is Cooperation Possible?", PISM Policy Paper no. 49 (January 2013), 5.

34 Ministry of Economy of Poland, Energy Policy of Poland until 2030 (with annexes), ,2009.

35 In November 2013, the Chancellery of the Prime Minister of Poland published the report on the Optimal energy mix for 2060 (version 2.0). This report is considered to be a basis for the future update of the energy strategy for Poland. See: Grzegorz Klima, Dorota Poznańska, Kancelaria Prezesa Rady Ministrów. Departament Analiz Strategicznych: Model optymalnego miksu energetycznego dla Polski do roku 2060. Wersja 2.0.

36 Ministry of Economy of Poland, Prognosis on fuel and energy demand until 2030 (update from 2011), Annex 2 to Energy Policy of Poland until 2030.

37 Tomasz Prusek, Czy zimą 2017 r. zabraknie w Polsce prądu?, *Gazeta Wyborcza*, 7 August 2013.

38 Michał Wilczyński, Zmierzch węgla kamiennego w Polsce, Instytut na rzecz Ekorozwoju (2013). ("Twilight coal in Poland", Institute for Sustainable Development).

39 Najwyższa Izba Kontroli, Informacja o wynikach kontroli bezpieczeństwa zaopatrzenia Polski w węgiel kamienny (ze złóż krajowych), Warszawa 2009.

40 Institute for Renewable Energy, "The Development Plan for Microgeneration for Poland based on Renewable Energy Sources until 2020: A Synthesis", 2013.

41 Karolina Baca-Pogorzelska, "Węgiel brunatny wraca do łask", *Rzeczpospolita*, 4 April 2013.

42 Estimates about Poland's shale gas potential vary by several orders of magnitude from 346-768 bln m^3 according to a study by the IEA to 4.2 bln m^3 according to the Polish Geological Institute.

43 Jacek Ciesnowski, "Coal is still king", *Warsaw Business Journal*, 23 September 2013.

44 World Nuclear Association, Nuclear Power in Poland, as updated in February 2014.

However, critics say it is unlikely that the plants will ever be built.[45] A closer look at the history of nuclear in Poland helps putting things in perspective.

In the 1980s, the Polish government had started construction of two Soviet-design reactors, but both projects were abandoned after the Chernobyl disaster in 1986, with considerable loss of capital. After its 2005 political decision for nuclear, the Polish government started an ambitious strategy for new plants to be built in Poland as well as abroad. In 2007, Poland signed an agreement with the three Baltic states to jointly build a new nuclear power plant at Ignalina in Lithuania, where an old Soviet-design reactor was shut down for safety reasons. Some years later, however, a report commissioned by the Lithuanian government calculated that, under both high and low gas price scenarios, Lithuania would save substantially by not building the plant. In a consultative referendum in 2012, 63% of Lithuanian voters rejected the plan. Although legally the Lithuanian government could opt to ignore the referendum, the project has been *de facto* abandoned.[46] As construction had not yet started, the loss of capital for the Lithuanian project was limited to preliminary studies, but it consumed considerable political energy and effectively discouraged investments in alternative solutions for the Baltic region, like energy efficiency, renewables and perhaps gas infrastructure.

In addition to the consortium with its Baltic neighbours, the Polish government announced its intention to launch its own ambitious nuclear programme. According to the Nuclear Energy Programme adopted in November 2010, Poland aims to build 6 GW of nuclear capacity, with the first reactor starting up by 2020. On 28 January 2014, after more than a decade of debate, the Polish Council of Ministers approved the Polish Nuclear Program.[47] The document defines parts of the regulatory and institutional framework and it includes a schedule for the construction of two plants, according to which the first reactor would go online at the end of 2024, and the second one by 2035. Three years and two months after the 2010 plan, the Polish nuclear programme has already been delayed by more than three years.

In the nuclear programme of January 2014, the Polish government reminds that, according to the International Agency, the introduction of nuclear requires 10 to 15 years, including the construction of the first plant. By noting that in the case of Poland, almost the entire infrastructure needs to be created, the Polish government seems to express scepticism about its own schedule. In summer 2013, Prime Minister Donald Tusk had postponed the start of construction indefinitely, declaring: "I'm not ruling out nuclear in our energy mix, but [it will be] later than planned [...]. This is primarily due to the anticipated growth of natural gas as an energy source, including domestic shale gas."[48]

The nuclear program of January 2014 does not contain any decision about the most difficult issue: who shall bear the financial risk of the construction and how. The deal negotiated in 2013 by the British government with EDF to build two new reactors in the UK[49] clearly demonstrates that the construction of new nuclear plants in Europe requires heavy public subsidies. Their compatibility with EU law is still to be verified. In Poland, the political will of providing public subsidies has not yet been spelled out, and it can be predicted that once the real costs will be on the table the political discussion will change.

The role of renewables, (RES) in PL's energy strategy is limited to the bare minimum required by the EU,[50] and possibly not even that. Within just six months in 2013, the European Commission started different infringement procedures against Poland for failing to implement or to ensure full compliance with the Renewable Energy Directive (2009/28/EC), with the Directive on the Energy Performance of Buildings (2010/13/EC) and the Emission Trading Directive.[51]

The Polish National Renewable Energy Action Plan defines the country's 2020 targets as a renewables share of 15.5% of gross final energy consumption (0.5% higher than the national binding target established by EU Directive 28/2009/EC). The sectorial targets are a 19.1% renewables share in electricity generation and a 10.14% renewables share in transport. Nevertheless, in internal policy documents, the RES goal remains at 15%.

---

45 Zbigniew Karaczun, "Poland's Nuclear Plans", in *Energy of the Future? Nuclear Energy in Central and Eastern Europe*, eds. Karel Polanecký and Jan Haverkamp (Praha: Heinrich Böll Stiftung, 2011).

46 Unless cited differently, all information on the Polish and Lithuanian nuclear programmes mentioned here stems from the very useful report by Mycle Schneider and Antony Froggatt, World Nuclear Industry Status Report 2013, 27 ff.

47 Ministry of Economy of Poland, Program polskiej energetyki jądrowej. At the moment of writing, the document and the official website is available only in Polish. A short summary in English is available on the website of the Polish utility PGE, and on the information portal World Nuclear News. A thorough independent analysis of this document was not anymore possible within the present publication.

48 Business New Europe,"Poland backpedals on nuclear strategy", 19 June 2013.

49 The contract for difference agreed by EDF and the British government foresees a guaranteed feed-in payment for nuclear generation which is clearly higher than the payments offered by the German feed-in law for wind plants and ground-mounted solar plants that start operating in 2014. This is true already comparing the current prices in terms of EUR or GBP/MWh at the current exchange rate – with the important differences that the UK nuclear subsidy is due over 35 years from the start of generation and will be fully indexed for inflation, while the German feed-in tariff is limited to 20 years and is not indexed. Moreover, nuclear power plants receive further subsidies, as their civil liability insurance is limited to a maximum sum astronomically lower than the potential damage, while wind and solar are fully insured.

50 Patryk Wasilewski, "Poland to Fight Brussels on More Ambitious CO_2 Targets", *Wall Street Journal*, 26 September 2013.

51 Edith Bayer, "Report on the Polish power system, Version 1.0.", Agora Energiewende (2014).

PL's 2030 strategy, adopted in 2009, foresees a renewables share of 16% of final energy consumption by 2030.[52] Considering that the 2020 target is 15%, and taking into account the expected further cost reduction of renewables, 16% sounds more like a limit than a target. Wind power is expected to cover three-quarters of the renewables target for electricity by 2020, while biogas, biomass and hydropower are to make up the remainder. PL had recently been contemplating changes to the support scheme for large-scale renewable energy (see the next chapter).

Especially in the context of wind power deployment, there are also strategic plans to upgrade transmission and distribution grids, which suffer from long-term underinvestment and operate with high losses (11-12% in electricity). They urgently require modernisation and expansion.[53] In some parts of the country, wintertime blackouts and low voltage are common.[54] Investments in new interconnectors are also planned, which should increase capacities for power exchange with neighbouring countries.

Many district heating networks are old and have heat losses. A refurbishment plan would be particularly important, since district heating sales make up roughly 9% of PL's final energy consumption.[55]

52 Ministry of Economy of Poland, Energy Policy of Poland until 2030 (with annexes), Warsaw, 2009.

53 PSE Operator, Plan Rozwoju w zakresie zaspokojenia obecnego i przyszłego zapotrzebowania na energię elektryczną na lata 2010-2025, Konstancin-Jeziorna, 2010. See also Joanna Krawczyk, "Grid Connection of Wind Farms in Poland – Problems of Practical Implementation", *DEWI Magazin*, no. 37, August 2010, 26.

54 "Clean Energy Finance Solutions: Poland", Cambridge Programme for Sustainability Leadership, March 2013.

55 Euroheat & Power, TOP District Heating and Cooling Indicators for 2011.

1. Cross-border perceptions and information gaps

There is an array of misunderstandings and misperceptions among Czech, Polish, and German leaders and citizens about the nature of and rationale for the respective countries' energy policies. One reason for this is certainly insufficient communication, exchange, and information across the borders. This is something upon which all of the trilateral experts involved in this study and the 2013 workshops concur. Efforts to address these deficiencies – such as cross-border workshops, symposia, exchanges, and discussion – have apparently been fruitful, even if too few and limited in scope.

Moreover, the energy discourse of the three countries is very different historically. Germany's *Energiewende* has its roots in a public discourse about energy – particularly nuclear energy – that began in West Germany in the early 1970s and continued over four decades. The public perception of the Chernobyl disaster in April 1986 and the political reaction to it were very different in West Germany – where it strengthened the anti-nuclear movement and triggered the founding of a Ministry for the Environment in June 1986 – than it was in communist-ruled Poland and Czechoslovakia. There, the state curtailed public discussion about the causes and impacts of the accident. For the most part, they only happened in small, private circles. Nevertheless, Poland's plans to build the first Polish nuclear power plant in Żarnowiec were abandoned in the aftermath of Chernobyl.

As for Germany, it has had a vocal Green Party since 1980, which pushed progressive energy issues onto the political agenda. Today, there is a very broad consensus in Germany that nuclear power is not a long-term option, that sustainable economic policies are a priority, and that energy efficiency and renewables are the best way to address Germany's dependency on energy imports. Influential conventional-energies lobbies still apply massive pressure on the media and politicians, but they are now fighting a rear-guard battle to slow the process, while almost no one argues against its general direction.

In the Czech Republic and Poland, energy security has a very different political connotation than in Germany. Historically, both the Czech Republic and Poland have been the victims of their overbearing neighbours: Germany, Russia, and in earlier times Austria. Today, both countries find themselves reliant on gas and oil imports from Russia. Their priority is to become as energy-independent as possible using various available options such as conventional fossil fuels, unconventional gas and nuclear power.

Although liberalisation has changed the energy markets in all three countries, implementation of the EU energy market directives has been uneven. Revamped versions of the old, state-run utilities like ČEZ in the Czech Republic and PGE in Poland still dominate the production, supply and distribution markets – as well as access to information. At times, this obscures the real costs of fossil fuels and nuclear power compared to those of renewables. Energy producers, including some trade unions, have greater influence than energy consumers. Indeed, the environmental movements in Central Europe are substantially weaker than those in Germany.

Nevertheless, Polish and Czech experts argue that the potential for renewables in both countries is much higher than most citizens realise (see below). In Germany too, ownership unbundling was implemented relatively late, but the transmission system operators have now become truly independent players, with two of the four owned by foreign companies. The former monopolies have been seriously weakened, largely because of their failure to embrace the energy transition, because for many years they bet on a reversal of the nuclear phase-out rather than investing in renewables.

Yet it is not the case that the German media are somehow "pro-*Energiewende*", while the Czech and the Polish media are "anti-*Energiewende*". In Germany, there has been a systematic effort on the part of certain media (among them some of Germany's biggest names including *Der Spiegel*) to discredit and slow down Germany's transition to renewables. These media have gladly picked up and reiterated the arguments of Germany's fossil fuels and nuclear sectors, warning in the direst of tones of blackouts, power shortages, price explosions and prostrate German industries.[56]

One of the chief antagonists in the media furore over the *Energiewende* is the Alex Springer Verlag, one of Germany's largest media houses and publisher of the mass-circulation *Bild-Zeitung*, as well as the daily *Die Welt* and many other titles. In Germany, Springer media are known for their conservative sympathies and often populist tone. In fact, one of Heinrich Böll's most famous novels, *The Lost Honour of Katharina Blum*, published in 1974, was a fierce critique of Springer's methods and influence.

Although the atmosphere in Germany is less raw than in the 1970s, in recent years the *Bild-Zeitung* has turned its focus and populist verve to the *Energiewende*. In spring 2011, after the shutdown of seven nuclear power plants, *Bild* readers

56 See Claudia Kemfert, *Kampf um Strom: Mythen, Macht und Monopole* (Murmann Verlag, Hamburg).

were constantly warned about imminent blackouts and the inevitable decline of the German economy. Almost three years later, Germany's power supply remains among the most reliable in the world, and the German economy is thriving. The show must go on, however: at the moment of writing this sentence, the most recent *Bild* headline on this topic reads "Energiewende jeopardises 200.000 jobs".[57]

In Germany, it is well known that Springer Verlag is one of the largest publishing houses in the country and boasts a clearly conservative profile. But not so well known is that it holds 50% of Ringier Axel Springer Media AG, a leading integrated multimedia company in Central and Eastern Europe. According to its own web site, Ringier Axel Springer Media manages an "extensive portfolio of over 70 print titles and more than 60 digital offerings in the expanding markets of Poland, the Czech Republic, Slovakia and Serbia" and "is the market leader in tabloid publications and one of the largest magazine publishers in the region".[58] In November 2013, Ringier Axel Springer Media proudly announced that its publication *Newsweek Polska* and server *Newsweek.pl* were the most frequently cited media in Poland, the latter heralded by independent observers as "the most opinion-forming internet medium" in Poland.[59]

The ideological affinity of the Springer media in Germany and their cousins in Central Europe can be quite close. According to the Federal Agency for Civic Education, a German public agency, "… the Springer Verlag's [Polish] tabloid *Fakt* is a clone of the *Bild-Zeitung* […] Interestingly, *Fakt* frequently publishes anti-German texts, just as *Bild-Zeitung* frequently publishes anti-Polish texts. Some observers believe that this is a deliberate strategy on the part of the publishing house …".[60]

The same goes for the energy transition. A lead article published on *Newsweek.pl* a few days before the 2013 German elections addresses the *Energiewende* with the headline "Merkel's Germany Plan like the Third Reich". The story is accompanied by photos of German highways in the 1930s next to today's wind and solar plants, the latter behind a fence with a high-voltage warning sign, reminiscent of a concentration camp.[61] The subtitle reads: "Just as the Nazi economy was fuelled by the construction of highways and giant rearmament programmes, in the 21st century the German economy is to be driven by the energy revolution". After some analysis of the upcoming elections, the article continues: "Before the war, public works plans for road construction and state intervention led to ever-increasing political control over the economy and their consequent subordination to the Nazi war plans. Unfortunately, the current transformation may also end up with a series of errors and distortions."

In CZ, the tabloid *Blesk*[62] is one of the main media that until recently belonged to Ringier Axel Springer Media. On the German energy transition, *Blesk* has featured articles with the following headlines: "Electricity prices in CZ will go up 30% because of the Germans!",[63] and "German energy transformation jeopardises industrial employment".[64]

The cited articles are not necessarily representative of the tone of Polish and Czech media concerning Germany generally, but these examples show that certain media houses convey a coherent message against the energy transformation in all three countries. The influence of a single media group – such as Springer – should not be over-estimated, however. In each country, the energy policy debate has its own dynamic, leading to divergent discourses and conceptions that make cross-border learning more difficult.

In both PL and CZ, Germany's *Energiewende* is generally looked upon with a good deal of scepticism, especially by the national political elite, although this opinion is not hegemonic. There is also no consensus on the science and politics of climate change. Germany's renewable energy policies are regularly mentioned as failures, due in large part to allegedly inflated costs. In PL, renewables are described as a luxury which the country cannot afford, although the discussion in PL appears less antagonistic than in CZ.

At the same time, many independent energy experts and local-level authorities are fascinated by the German example, and interested in reproducing its successes, such as the empowerment of independent and small-scale energy producers. Opinion polls show Polish citizens enthusiastic about the possibility of renewables, but worried about the costs.

---

57 *Bild*, "Energiewende gefährdet 200 000 Jobs", 16 December 2013.

58 Quotes taken on 22 January 2014 from the holding's website: http://www.ringieraxelspringer.com/en/company.

59 See http://www.ringieraxelspringer.pl/en/press/press-releases#new-1111.

60 Michał Maliszewski,"Wem gehören die Medien?", Bundeszentrale für Politische Bildung 10 August 2009.

61 See Energiewende: Niemcy Merkel planują jak III Rzesza, published on 18 September on *Newsweek.pl* by a *Newsweek.pl* journalist Michał Wachnicki (accessed on 22 January 2014).

62 According to press reports, in December 2013 the Ringier Axel Springer Verlag sold its Czech media holdings, including *Blesk*, to two Czech entrepreneurs. The examples cited in this chapter were published before this deal was announced.

63 *Blesk*, V Česku zdraží elektřina o 30 %, kvůli Němcům!, 1 June 2011.

64 *Blesk*, Transformace německé energetiky ohrožuje zaměstnanost v průmyslu, 16 December 2013.

The only known opinion poll which explicitly measured Polish opinions on German renewable energy policies surveyed over 200 municipal administrations. Half of the officials asked suggested that Poland could benefit from Germany's experience in developing renewable energy.[65] As did the experts in our trilateral discussion group, the study noted differences in perspective between Poland's national officials on the one hand, and those of consumers, business actors and representatives of local government on the other.

2.1. Energy policy debate and perception of the Energiewende in the Czech Republic

According to the Czech experts in the trilateral group, the reputation of renewables as such has suffered immensely from a botched 2010 policy initiative that set a tariff for photovoltaic generation too high and caused end-consumer power prices to shoot up (see Chapter 3 below). Moreover, the largely state-owned conventional energy sector sees renewables as a threat.

Nevertheless, there are opinion polls which show that renewables, particularly small-scale ones, enjoy public support in CZ. In June 2012, the Alliance for Energy Independence released the results of a poll showing that 75% of those surveyed supported renewables and 25% viewed them negatively.[66] A Czech Friends of the Earth survey in December 2012 asked what energy source the state should invest in to save Czechs the most money in 10 years' time: 40% said energy efficiency; 25% said renewables; 17% preferred nuclear; 12% wanted investment in coal; while 5% would have left it up to "the free energy market".[67]

Despite this, Czech citizens remain overwhelmingly behind nuclear power. According to an EU-wide survey carried out in 2009 on behalf of the European Commission, nuclear energy enjoys greater support in CZ than in any other EU member state.[68] According to the experts in the trilateral group, the country's official energy strategy, which aims at increasing the nuclear share to 50% by 2030, is not a source of discontent or protest. A survey paid for by the nuclear industry suggested that if the issue were to be put to a referendum, 70% of voters would support the construction of new blocks at the Temelín nuclear power plant.[69] Nevertheless, it must be noted that citizens start from the (false) assumption that nuclear is the cheapest source of electricity. However, as discussed in Chapter 1 above, the situation might change once the public faces up to the reality that new nuclear reactors cannot be built without substantial public subsidies and guarantees.

The Czech debate about the *Energiewende*

In the Czech Republic, Germany's *Energiewende* meets with considerable public scepticism. Among the political parties, only the comparatively small Green Party (Strana zelených) is positive about the *Energiewende*. According to the experts in the trilateral group, the issue of transit flows, which is claimed to undermine the Czechs' grid stability (see section 3.2) is a regular topic that damages the image of German energy policies in CZ.

The Fukushima disaster certainly did not send Czech politicians such as Prime Minister Petr Nečas the same signal that it sent to Germany. In the aftermath of Fukushima in spring 2011, Nečas warned Czech citizens not to buy into "media hysteria" about nuclear energy. The Czech Republic, he said, is in no danger of a natural disaster comparable to that in Japan [the earthquake and tsunami] and he called Germany's move away from nuclear a "cheap way to frighten the public".[70] "We must keep a cool head, and not start believing that nuclear power has no future," echoed Czech MEP Jan Březina.[71]

Abandoning nuclear power, many Czech citizens seem to believe, is a mistake that Germans and German industry will pay a high price for. According to our Czech experts, high consumer costs resulting from DE's nuclear power phase-out are a regular trope in the Czech media. Germany's turn away from nuclear energy makes electricity more expensive for

65 Andrzej Ancygier and Kacper Szulecki, "German-Polish Cooperation in Renewables: Towards Policy Convergence?", *Dahrendorf Symposium Paper Series*, 2013, 3.

66 "Většina Čechů podporuje obnovitelné zdroje", *E15*, 12 June 2012.

67 "Průzkum: 65 % obyvatel chce energetickou koncepci založenou na úsporách nebo zelené energii", Hnutí Duha, 6 November 2012.

68 "Europeans and Nuclear Safety", Special Eurobarometer 324, 2010.

69 "STEM: Podpora jaderné energie mezi Čechy po Fukušimě znovu roste", *Patria*, 20 June 2012.

70 "Nečas: Strach z jádra je zbytečná hysterie", *Hospodářské noviny*, 16 March 2011.

71 Ibid.

German industry, then Minister of Industry and Trade Martin Kuba told the online version of the daily *Lidové noviny* in June 2012, and is something the Czech Republic should avoid at all costs. Nuclear, gas and coal are the Czech Republic's energy future, he reiterated.[72]

Czech energy giant ČEZ, a state-run conglomerate that dominates the energy sector, is often cited in the media. Just after Germany shut down seven nuclear power plants in 2011, ČEZ representatives warned of industrial flight in dire tones: "Big industrial companies will be contemplating whether they want to stay in Germany in the context of rising electricity prices," said Martin Roman, the head of ČEZ at the time. "Sooner or later big industry will move abroad, I'm sure about that." However, he also saw opportunities for the Czech (nuclear) energy industry: "The bigger the deficit of electricity in Germany after the closure of the nuclear power plants, the more chances are open for us."[73] It would be interesting to ask him about his view today: three years later, Germany's electricity exports have increased, and the very low marginal costs of (German) wind and solar electricity are heavily impacting ČEZ's profitability.

In fact, ČEZ's wrong assumptions were picked up by Czech politicians. For example, in a meeting with Saxony's prime minister in 2011, then Czech Prime Minister Petr Nečas declared: "Our preliminary calculations show that Germany's decision to withdraw from its nuclear programme will lead to a 30% increase in electricity prices in the Czech Republic and have a serious impact on the competitiveness of our industrial sector."[74]

With German renewables bringing down electricity prices throughout Central Europe, the reality is showing exactly the opposite of what was forecast: over these past two and a half years, Germany not only remained a net electricity exporter, it also increased those exports. Czech energy users benefit from lower prices and could probably benefit much more if the Czech Republic would make its power system more flexible and if the government would enact serious antitrust control, weakening the position of the dominant utility, ČEZ. As for its assessment of nuclear costs, ČEZ has made important steps towards accepting reality, as it has declared it will not invest in new nuclear power plants if the government does not assume all risk and offer heavy subsidies (see Chapter 1). However, these facts are seldom reflected in the Czech media.

2.2. Between leadership and self-referentiality: Germany and the foreign policy dimension of the energy transition

For decades, and particularly in recent years, energy policy has received a higher degree of attention in Germany than in several other European countries. However, as in other countries, the German debate around energy is often self-referential: the perception of developments and discussion in other countries is generally weak and is not infrequently biased by prejudices and misconceptions about other countries and about the role of DE itself. For instance, many Germans are surprised when confronted with the fact that DE's CO_2 emissions per head are substantially higher than Poland's.

Germans' strong support for the energy transition is not only about environmental concerns; achieving independence from external energy supplies is an important driver, too. For instance, over 100 local communities have pledged to green their entire energy supply by 2040 at the latest.[75] Independence from external supplies is also a driver for many households starting to produce their own energy, mainly using solar or biomass.

A frequent corollary of this kind of autonomy-minded thinking is relatively little interest in what happens outside one's borders. Many people actively involved in the *Energiewende* in DE tend to think that successful domestic implementation of its energy transition is the best contribution DE can make to climate protection and a more sustainable energy supply system at the international level. If DE succeeds in the transition to a low-carbon energy supply system based on renewables, the way will be open for other countries that might want to follow. If DE fails, this vision will be difficult to promote.

On the other hand, there has also been a long history of strong German engagement on behalf of renewables and climate protection at the international level. For example, DE's proactive diplomacy was crucial for the approval of the EU 2020 climate and energy package, and DE also played a decisive role in establishing the International Renewable Energy

72 "Obnovitelné zdroje příliš zdražují energie, říká Kuba", *Lidovky.cz*, 14 June 2012.

73 "Roman: Německo bez jádra přijde i o průmysl", *Lidovky.cz*, 2 May 2011.

74 "Německo bez jádra zdraží elektřinu v Česku o třetinu, bojí se Nečas", *Ihned.cz*, 1 June 2011.

75 See for instance the campaign "100% renewable energy reasons", http://100ee.deenet.org/.

Agency in 2009. Over the years, the German government, German companies and NGOs have sponsored thousands of awareness-raising events and demonstration projects.

One difficulty, however, is that the relative disinterest in developments abroad often comes with a certain sense of superiority. Many German citizens see DE as a strong leader on climate, renewables and efficiency, which is the case in some but not all of these areas. DE's leading role in renewables is broadly recognised, and German citizens have good reason to be proud of their achievements including, for instance, their major contribution to the decrease of PV prices which has paved the way for solar energy to be a pillar of the future global energy supply. However, as outlined above, in several areas DE is actually less efficient and climate-friendly than the EU average. Moreover, other countries are more advanced in solar (Italy) and in wind (Denmark, Portugal, Spain and Ireland).[76] Norway is at the forefront of electromobility.

Despite the negative perceptions that are widespread in the Czech and Polish media, the German *Energiewende* enjoys a positive image among many citizens and experts abroad.[77] German institutions and companies could use this to proactively promote a positive image of DE abroad. For this purpose, the foreign policy dimension of the *Energiewende* should be given higher priority, as should dialogue and collaboration with civil society in partner countries.

The debates around energy in eastern Central Europe are rarely mentioned in the German media. Despite their proximity, few people in DE understand Polish culture and politics. In the German energy policy community, PL is perceived as a coal-based country with little interest in renewables and energy efficiency. An exception to its usual indifference, Poland's veto in the climate negotiations was registered among the German public and reinforced the impression or stereotype of an incorrigibly coal-prone country which is very difficult to deal with from the point of view of German energy policy goals.

CZ is even less present in the German media. While German specialists registered the short-lived explosion of demand for solar PV in CZ, most of the German public did not. In the media, energy-related news from CZ usually concerns the nuclear plant at Temelín. Usually this debate is presented from the German/Austrian perspective without really looking at the internal dynamics and drivers inside the Czech Republic.

2.3. Energy policy debate and perception of the Energiewende in Poland

While the mainstream national media and politicians are sceptical about or openly critical of renewables and the energy transition, in PL there is also considerable open-mindedness towards renewables as the energy source of the future. A 2013 polling of Polish municipalities showed that two-thirds of local officials see renewable energy as an opportunity for local economic development. As for the energy technology they would like to see promoted in PL, the officials opted first for solar PV, followed by wind, hydro and then shale gas. Nuclear and lignite were at the bottom of the list.[78]

There also appears to be widespread public support for small-scale renewables. A March 2013 survey conducted by the Institute for Renewable Energy (IEO) found that 45% of Poles want to have small-scale renewable energy in their households.[79] An October 2013 poll conducted by the Public Opinion Research Centre on behalf of Greenpeace Poland found that 89% percent of Polish citizens want more energy to come from renewable sources. Moreover, more than two-thirds of Poles (70%) want an energy policy framework supporting the development of renewable energy compared to coal and lignite (18%) and nuclear energy (16%). Finally, 73% of the Polish people would like PL to be more involved in measures to prevent the negative effects of climate change.[80]

---

76 In 2012, the share of solar PV generation in national electricity consumption was 5.7 % in Italy compared with 5.1% in Germany. In the same year, the wind share was 29.8% in Denmark, 20.4% in Portugal, 18.2% in Spain, 15.5% in Ireland and 8.5% in Germany (all data provided by ENTSO-E). It should be taken into consideration, however, that Germany must cope with weaker solar and wind resources than these countries.

77 A survey on behalf of the Konrad Adenauer Stiftung found that energy experts from business, the public sector and NGOs in Brazil, China and South Africa have a remarkably positive opinion of the *Energiewende*; see: "The Perception of Germany's 'Energiewende' in Emerging Countries". A similar conclusion was drawn from a survey conducted by TNS Emnid on behalf of WINGAS among energy experts in Austria, Belgium, the Netherlands and Germany. Less enthusiasm emerged from a survey of the World Energy Council among its expert network, several of whose members are from large conventional energy companies. However, even among this constituency, a 56% majority expect that parts of the German energy policy concept will be copied by their own countries, while a growing portion of 24% considers the *Energiewende* to be a blueprint for the rest of the world.

78 Andrzej Ancygier and Kacper Szulecki, "German-Polish Cooperation in Renewables: Towards Policy Convergence?", *Dahrendorf Symposium Paper Series*, 2013, 3.

79 Markus Trilling, "Polish citizens to help meet country's energy needs", *New Europe*, 6 August 2013.

80 See http://www.greenpeace.org/international/en/press/releases/Poles-back-renewables-and-climate-action-despite-Tusk-governments-total-support-of-coal/.

Indeed, according to Polish experts who participated in the trilateral dialogue, popular backing for coal is diminishing. Poland has a long history of coal extraction and a strong coal lobby with close ties to political parties and the media. Yet small and medium-sized Polish cities, which are faced every year with the problem of winter smog, are starting to take action. In November 2013, for example, the Małopolska regional council in southern Poland, where Kraków is located, adopted a resolution to ban the burning of solid fuels (except wood in fireplaces) in domestic boilers by 2018.

During the Climate Change Conference in Warsaw in November 2013, PL came under heavy criticism for its coal policies, and this created debates also in Polish media. The liberal daily *Gazeta Wyborcza* hosted different voices. The author Tomasz Prusek wrote: "One can get the iimpression that Poland and its coal are the biggest problem global climate protection faces, not China and India [...] that together with the USA are responsible for more than 50% of the global CO_2 emissions. […] There are important reasons for Poland not wanting to renounce coal: we are a country in the midst of development and need cheap energy. [...] We lack the resources to straighten out rivers and build hydroelectric power plants on a large scale. A pressure to abandon coal is an incitement to commit an economic suicide."[81] However the same newspaper had published one week earlier an article by the author Tomasz Ulanowski titled "Are the sun and the wind less Polish than coal?", arguing that the Polish obsession for coal is a symptom of backward thinking of Polish politicians.[82] And, just two days after the conservative article of Mr Prusek, Mr Ulanowski could publish an article in *Gazeta Wyborcza* on the history of coal, implying that the revolution towards renewable energies is only a question of time.[83]

A broad majority of public opinion seems to support developing shale gas. In PL, gas is seen as clean, easy and efficient, but too expensive for the average family. After an initial period of enthusiasm, however, the expectations for gas shale production in PL have been drastically reduced (see Chapter 1).

Once-high support for nuclear power, on the other hand, has fallen off significantly. The nuclear option was a regular theme among politicians close to the centre-right government until recently, when its prospects dimmed as a result of higher-than-expected cost projections (see Chapter 1). There was a pro-nuclear media campaign in 2011 that boosted backing for nuclear in the short-term. Until the Fukushima disaster, a majority of Polish citizens backed the development of nuclear power as an option in Poland's quest for energy security. According to opinion polls in 2009 and 2010, about 60% of the population supported nuclear power plants in Poland to reduce its dependence on foreign energy sources.[84] According to a comparative poll by Ipsos MORi, short after the Fukushima disaster the support was still at about 57%, making of Poland the second country with the highest support for the use of nuclear power, after India[85]. However, more recent polls suggest that post-Fukushima support for nuclear decreased to just 35% in favour and 52% against.[86] Those in favour of nuclear tended to be disproportionally young, well-educated people.

The Polish debate about the *Energiewende*

In the media, Germany's 2011 turnaround on prolonging the life of its nuclear power plants is often written about as an irrational reaction. The upshot of the *Energiewende*, it is widely said, is soaring energy prices that are detrimental to both DE's and PL's economies. The alleged total cost of one trillion euros mentioned by the then German Environment Minister Peter Altmaier (see Annex) is regularly cited as evidence of the cost burden and the impossibility of PL doing anything of the sort. According to our Polish experts, Polish citizens also tend to see DE's "exit from nuclear" as a "return to coal", which implicitly justifies PL's pro-coal orientation.

In 2013, PL's media offered a sampling of opinion on German energy policies. In the daily *Dziennik Polski*, for example, commentator Jan Maria Rokita, formerly a leading politician in the centre-right Civic Platform, said: "The ambitious programme of restructuring Germany's, and subsequently Europe's, energy sector, namely the *Energiewende* created by Merkel's government, is nothing other than a symmetrical reversal of Polish interests. It proposes closing nuclear power plants by 2022, the date when, theoretically, Polish nuclear plants were supposed to be open. It also stipulates punitive fines and the closing of coal mines by 2018, forbidding shale gas fracking, and the complete rebuilding of the market to accommodate 80% renewable energy by 2050." Rokita called the *Energiewende* a "disaster for the Polish

81 Tomasz Prusek, "Na rozwód z węglem nas nie stać," *Gazeta Wyborcza*, 19 November 2013.

82 Tomasz Ulanowski, "Czy słońce i wiatr są mniej polskie niż węgiel?" *Gazeta Wyborcza*, 19 November 2013.

83 Tomasz Ulanowski, "Pługiem i węglem" *Gazeta Wyborcza*, 21 November 2013.

84 "Emerging Nuclear Energy Countries", World Nuclear Association, April 2009.

85 IPSOS, Global citizens reaction to the Fukushima nuclear plant disaster, June 2011.

86 Krzysztof Pankowski, "Polacy o energetyce jądrowej i gazie łupkowym", Fundacja Centrum Badania Opinii Społecznej, May 2013.

economy".[87] In some cases, leading Polish media even characterise Germany's energy transition plans as on par with Nazi economic policies and rearmament programmes (see the introduction to Chapter 2). While such comparisons are not representative of the general tone of the Polish media, they show how delicate the dialogue between PL and DE can be.

Mariusz Janik, a journalist with the daily *Dziennik Gazeta Prawna*, called DE's "green revolution" to be gradually turning into "a nightmare". Two years after Merkel's decision "to shut down all of the nuclear power plants and to switch to renewable energy," he claimed, "the country is consumed by quarrels. Although there is enough electricity, Germany desperately lacks the requisite transmission grid. Plans to build new ones meet fierce protests and the price of electricity is rising dangerously […] Across the country, Germans hit by rising energy prices have turned to more traditional forms of saving energy costs –for example, stealing wood from German forests."[88]

Energy experts from many more liberal independent think tanks generally agree about the importance of the *Energiewende*, even if they do not make it into the media as often as the naysayers. Although Poland does not have a politically visible Green Party, there is a vibrant community of research institutes and think tanks, experts, environmentally-minded NGOs and independent-minded thinkers in favour of renewable energy.

87 Jan Maria Rokita, "Czy wygraliśmy niemieckie wybory?", *Dziennik Polski*, 27 September 2013.

88 Mariusz Janik, "Po rewolucji płoną lasy", *Dziennik Gazeta Prawna*, 30 March 2013.

3. Three core issues tackled in the trilateral dialogue

In this chapter, we look at three core issues that draw much of the energy policy attention in all three countries, particularly when it comes to the relationship between them. While an overview of key energy indicators and policies has already been provided in Chapter 1 above, the following elaborations are focused solely on electricity and go into more depth. For the benefit of offering comprehensive insight also to the reader who turns to this section exclusively, some of the information provided above is repeated, although very briefly.

The first section of this chapter looks at the electricity system and markets. The second section looks at the so-called transit flows of electricity coming from northern DE and going to Austria and southern DE through PL and CZ. The third section looks at the support schemes for renewable electricity.

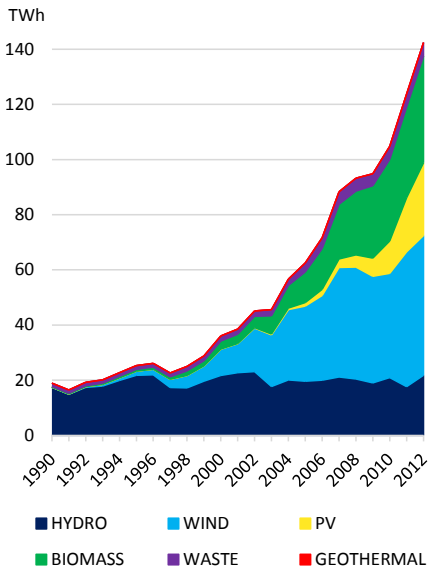
3.1. Electricity system and markets

This section analyses some key trends in the electricity systems and markets of the three countries. The section starts with DE because the massive increase of renewable generation in DE is having a major impact also in its neighbouring countries.

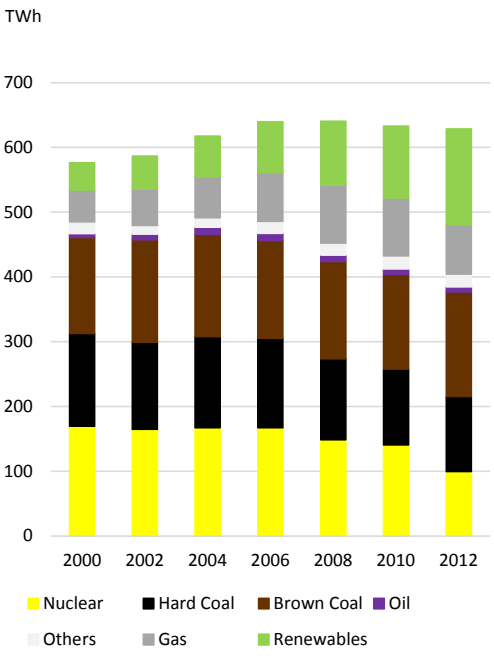
The German electricity system and market

The growth of the renewable electricity (RES-E) in generation has been impressive. In absolute terms, total renewable electricity generation more than tripled from 2002 to 2012.

Renewable Electricity Generation in Germany



Development of German generation mix



Sources: Federal Ministry for Environment (BMU), Federal Ministry for Economy (BMWi).

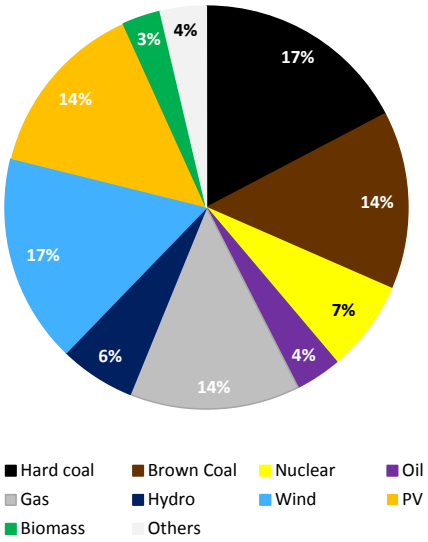
In relative terms, the growth of renewables was huge, from 7.7% of total electricity consumption in 2002 to 23.5% in 2012. However, this means that fossil fuel and nuclear power plants still generate more than three-quarters of the electricity, as shown in the chart about the development of the German generation mix.

In the last few years, total electricity consumption declined slightly because of energy savings efforts as well as the economic crisis in Europe.

Due to the fluctuating nature of wind and solar, the capacities of renewables are larger than their share of generation. For this reason, renewables already make up 40% of total generation capacity in DE. Nuclear represents only 7% of German power generation capacity.

In March 2011, the German government decided to close seven nuclear power plants. Sceptics and opponents inside and outside DE (see Chapter 2) argued that this would lead to problems. The warning included the risk of DE suddenly becoming a strong power importer and thus a steep increase in power prices affecting neighbouring countries; a strong increase of fossil fuel consumption; and a high risk of supply restrictions and even blackouts. None of these warnings proved well-founded.

German power generation capacity 2011

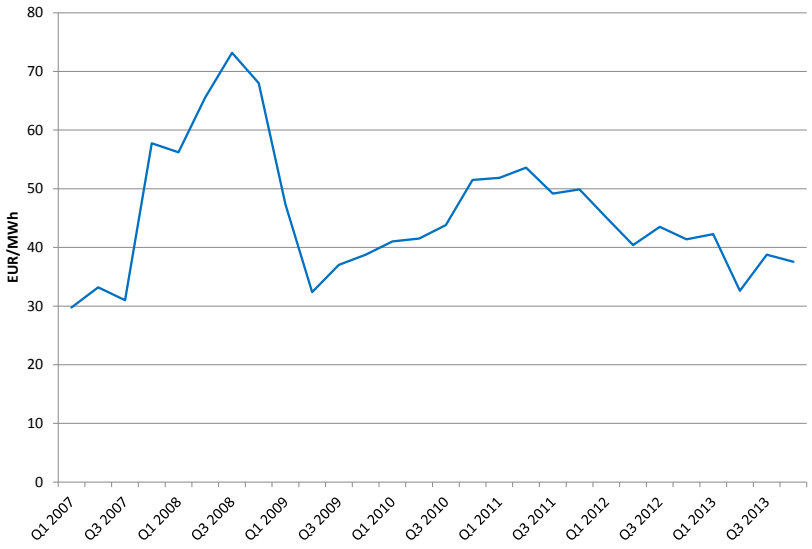


Source: Federal Ministry for Economy.

Comparing 2010 with 2012, the strong reduction (-41.1 TWh) of nuclear generation was already almost completely compensated for by the growth of renewable generation in DE (+37.3 TWh) and by a slight decrease in consumption (-1.2 TWh). In these two years, German net electricity exports increased from 17.7 to 23.1 TWh. DE often exports at low prices during hours of high wind or solar production. This reduces the profit margins of fossil fuel and nuclear generators in DE and in neighbouring countries. It is not surprising that they complain, but those buying electricity on the wholesale market benefit.

The total share from fossil fuels in 2012 was identical to that in 2010, before the shutdown of the seven nuclear power plants. However, gas generation declined significantly and coal generation increased. This fuel switch from gas to coal is exactly the opposite of what is desirable for climate protection. The main reasons are a further collapse of the CO_2 prices; the excessively cheap marginal costs of brown coal which do not include the social and environmental costs it incurs; a decrease in hard coal prices on the global market due to US exports, as a consequence of the abundance of shale gas, which, however, has not resulted in a comparable reduction of gas prices in Europe; and a decrease of wholesale power prices due wind and solar generation.

Average Price for Baseload Power (EPEX Spot)



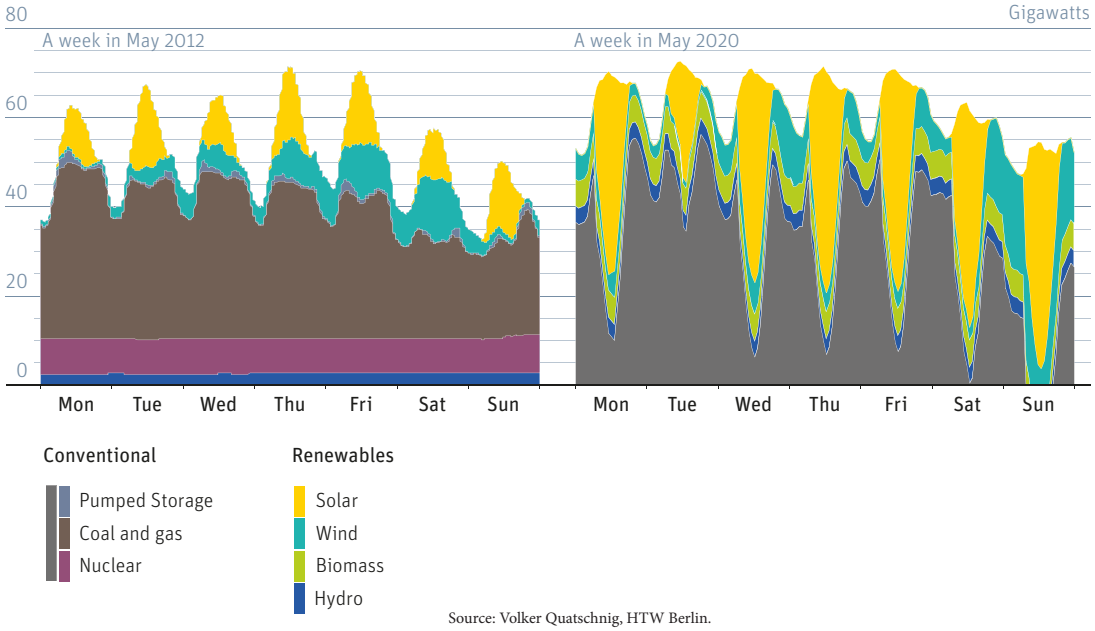
Source: EEX data, elaborated by Candole Partners.

The chart above shows the declining trend in average (quarterly) spot prices for baseload power. The latter refers to deliveries during night and weekend hours, while peak load refers to deliveries during the day. The price peak in 2008 was mainly due to speculative dynamics and specific contingencies. In 2009, the reduction in consumption (-6.5% compared to 2007) was the main driver. Since 2010, however, consumption has risen again. It can be seen that after the closure of the nuclear power plants wholesale baseload power prices declined on average.

Occasionally, power prices have even become negative. Negative prices occur at times of high solar and wind production with low demand. Solar and wind have marginal costs close to zero, and therefore even if priority access were not legally defined for them, they are always very cheap bidders in any event. In such situations, the operators of inflexible plants, i.e. mainly brown coal and nuclear, often prefer to pay money (i.e. to make bids with negative prices) to get rid of their electricity rather than have to shut down and then restart their power plants, which is expensive and increases wear and tear as well as the risk of accidents. Negative prices are also caused by both the general market design and the design of the schemes to remunerate renewable electricity generation: in Denmark, for instance, wind plant operators do not receive any revenue when prices are negative. Until a reform is introduced in DE, German wind and solar plant operators also have an incentive to generate even when prices are negative instead of cutting production for some hours or considering other options such as storage. Once this issue is solved, however, negative prices are still likely to occur unless numerous nuclear and brown coal power plants reduce production at times of low or negative prices.[89]

In other words, the power system of the future will require more and more flexibility. This can be seen in the chart below:

Estimated power demand over a week in 2012 and 2020, Germany



Source: Volker Quatschnig, HTW Berlin.

The graphic on the right suggests that in the relatively near future there will be no need for baseload power plants, i.e. plants running 24 hours a day most days during the year. Instead, a combination of flexible sources and backup capacities will be needed, including flexible demand, flexible power pants (hydro, biomass, gas) and efficient storage systems.

This is why high shares of renewables conflict with inflexible conventional power plants. Even if they were not dirty, dangerous and expensive (especially considering external costs and hidden subsidies), nuclear power and brown coal-fired generation are widely considered to be in conflict with high shares of wind and solar because of their inflexibility. Part of the debate about loop flows at the German-Czech-Polish border (see below) can be better understood through this lens.

89 Johannes Mayer et al., Kohleverstromung zu Zeiten niedriger Strompreise, Fraunhofer-ISE (2013).

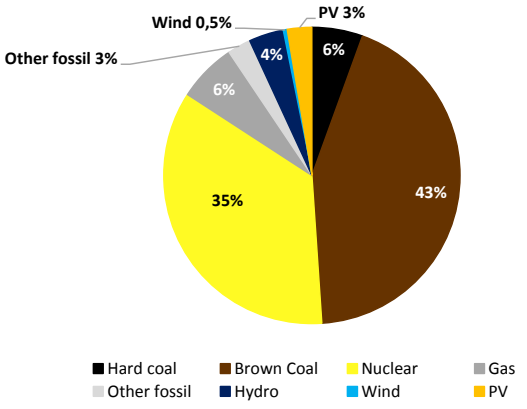
When the Polish and Czech power systems are "flooded" with cheap wind and solar electricity coming from DE, it would be very convenient for Polish and Czech consumers to buy it rather than transferring it on to other countries and consumers. Technically, this would be possible if the power plant portfolio in PL and CZ were flexible enough – for instance, through flexible gas, biomass and biogas power plants, as well as more hydro storage. It is possible that such flexibilities are already available or could be activated at low cost. However, this would imply a loss of revenues for the incumbent coal and nuclear plant operators. Actually, this can be seen more as a domestic conflict between power consumers and power producers than as a conflict between countries.

The Czech electricity system and market

As shown in the chart below, the Czech electricity generation mix is dominated by brown coal (43.4%) and nuclear (35%). Gas has a low share of 6.4%, hard coal 5.5%. Hydropower contributed 3.7% and solar PV 2.7% in 2012, while wind is almost non-existent (0.5%).[90]

In 2011, electricity consumption in CZ was 63 TWh, while total electricity generation was 81 TWh. CZ exported 17 TWh, i.e. 21.6% of the electricity generated in the country. Of all the EU countries (plus Norway and Switzerland), only Estonia had slightly higher electricity exports as a proportion of total generation.[91]

Czech power generation mix 2012



Source: ENTSO-E.

One company commands the lion's share of these exports: the partially state-owned conglomerate ČEZ controlled 73% of electricity generation in 2012, followed by EPH and Sokolovská uhelna, each with about 4% of the market.[92] On paper, the Czech market is among the most liberalised in the EU. All of the relevant EU directives have been fully implemented there, but the country's very high market concentration is a result of ineffective antitrust enforcement in the electricity generation sector. ČEZ has a strong influence on politics and the media in the Czech Republic and in the region. The Czech market is *de facto* closed to newcomers.

ČEZ operates the nuclear power stations in Temelín and Dukovany, as well as over a dozen coal-fired power plants. It also owns substantial distribution and sales networks as well as some electricity generation capacity in other Central and South-Eastern European countries. Although it has also invested in renewables, independent experts are convinced that ČEZ consistently undermines the deployment of renewables and of energy efficiency measures in CZ.

Czech wholesale electricity prices strongly correlate with those of its neighbours, especially DE and Slovakia. For historical reasons, CZ has a strong grid connection to Slovakia. The day-ahead markets of the two countries have been coupled since 2009. In 2012, the Hungarian market was also coupled to the Slovak one, but due to the weak interconnection between Hungary and Slovakia, the prices in the Hungarian day-ahead market are EUR 2/MWh higher on average.

Both in the short-term and future markets, Czech electricity prices are also highly correlated with German prices. Due to the size of its market, the trends in the German power market (see above) have a significant impact on the smaller markets of its eastern neighbours. The vast majority of Czech electricity production comes from nuclear and brown coal, and is therefore characterised by high fixed costs, high environmental impact and very low marginal costs. However, electricity's market price is set by the marginal power plant, i.e. by the most expensive of the power plants necessary to meet demand at any given time. At times of high demand and/or of low amounts of wind and solar generation, the marginal plant on the German market is usually gas- or even oil-fired, which implies substantially higher market prices.

90 Data provided by ENTSO-E.

91 Data provided by ENTSO-E.

92 ČEZ annual report, ERU 2012, own calculations by Candole Partners 2012. According to Eurostat, the market share of the largest generator declined from 74.2% in 2007 to 69.4% in 2011. There may be slight discrepancies between the different sources.

At such high prices, ČEZ and other Czech generators once enjoyed high profit margins by exporting to DE. Yet the decrease in wholesale electricity prices on the German market, caused to a substantial extent by the increase of wind and solar generation, has had a strong negative impact on the profitability of Czech generators.[93]

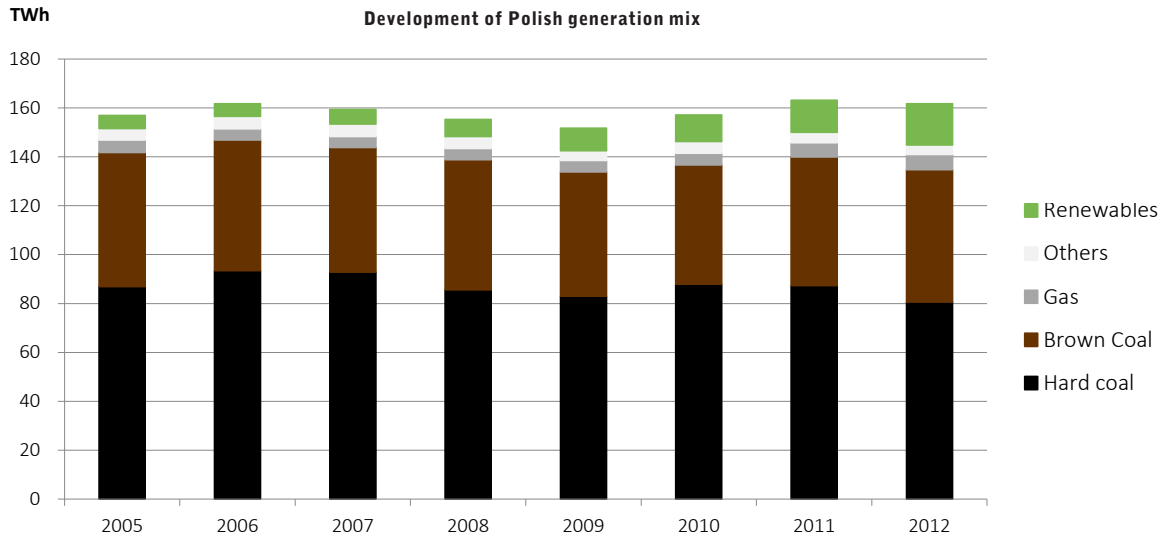
Another cross-border effect of renewables deployment in DE is the increase in spot-price volatility, including a small but growing number of hours with negative prices. Brown coal and nuclear plants cannot react productively to this volatility because of their inflexibility: rapid and frequent ramp-downs and ramp-ups are unattractive or impossible due to costs, technical limitations and in the case of nuclear to security issues. Therefore, the operators of brown coal and nuclear plants are prepared to sell their electricity for short periods at below their marginal costs, and even to pay to avoid having to shut down their plants. Nuclear and brown coal plants can be considered a main cause of occasional negative prices in DE and elsewhere. For this reason, increasing volatility on the German market is having a negative impact on the profitability of Czech generators, especially those of ČEZ. Finally, the rapid increase in variable renewable generation in DE is having an impact in terms of the increased transit flows of electricity from northern DE to Austria and from southern DE through CZ. A whole section below is dedicated to this issue.

The decreasing revenues and profitability of ČEZ imply lower income and dividend tax receipts for the main shareholder, i.e. the Czech state. In the long term, this might result in a loss of influence and in support for the emancipation of Czech politics from this monopolist.

At the same time, ČEZ's ability to raise money (debt and equity) for large investments has been weakened. This makes it even less likely that the planned additional nuclear reactors in Temelín will be realised in the foreseeable future (see Chapter 1).

The electricity system and market in Poland

In 2012, total electricity generation in Poland amounted to 159.8 GWh, and domestic consumption to 157.0 GWh, resulting in 2.8 GWh of net electricity exports. As shown in the chart below, hard coal and lignite dominate the Polish power mix with respective shares of 49.7% and 33.3% of 2012 power generation. During the last few years, the share of lignite has slightly increased due to the decreased profitability of hard coal-based electricity generation.[94]



Source: The Energy Market Agency.[95]

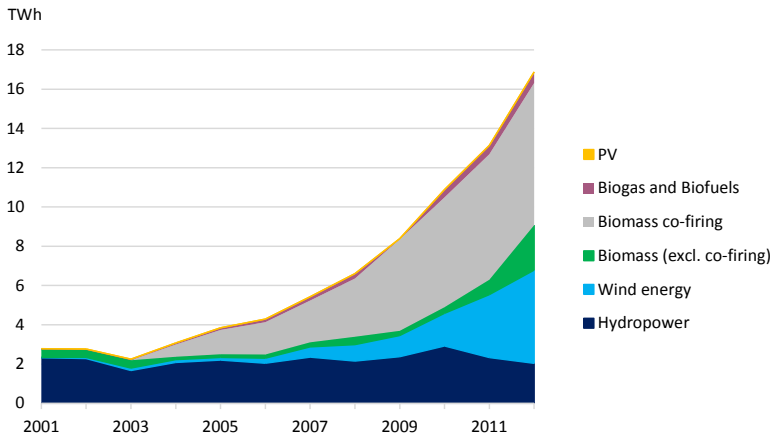
93 ČEZ annual statements, Ivan Kotev, "Temelinomics", Candole Partners, (2012) and Georgi Vukov, "Temelinomics 2", Candole Partners, (2013) ČEZ Unplugged, (2010).

94 The Energy Regulatory Office, National Report: The President of the Energy Regulatory Office in Poland, Warsaw 2013.

95 The Energy Market Agency Statistics 2013.

Generation from renewables has been increasing, but remains small with a share of 10.6% in 2012. The total installed capacity of renewables reached 4093 MW in 2012, of which there were 2564 MW of wind energy. Despite the strong growth in wind since 2010, as shown in the chart below, biomass co-firing still makes up the largest share of what is declared as renewable power generation. Biomass co-firing is particularly attractive due to the design of the Tradable Green Certificate System.[96]

Renewable electricity generation in Poland



Source: Główny Urząd Statystyczny.[97]

In Poland, publicly owned energy companies still dominate generation, distribution, and supply. Though not comparable with the Czech Republic, market concentration is still significant. In 2013, the publicly owned company PGE[98] had a 38% market share in generation, 25.5% in distribution and 24.4% in retail. In the generation market, the three largest companies (PGE; Tauron and EDF) control 61% of the generation market. In the distribution market, the three largest (Tauron, PGE and Energa) control 78.5%, and in the retail market the three largest companies (again Tauron, PGE, Energa) had 75.4% mrket share.[99] The transmission system operator PSE is state-owned.

Formally, Poland has met the legal requirements of unbundling vertically integrated companies in the energy sector. Nevertheless, in practice the separation is not sufficient. The bulk of the bilateral trade contracts are still conducted between companies belonging to the same holding.[100] To forestall potential bias, separating the ownership of electricity generation from distribution is crucial.[101]

Another important approach is to create incentives to stimulate the shift of larger volumes of electricity from bilateral (over-the-counter) contracts to the spot market. In 2009, bilateral contracts still accounted for 89.8% of the total volumes of traded electricity; only 0.2% of electricity was traded at the power exchange. The remaining 10% was sold at the balancing market and, to a lesser extent, abroad. The so-called "power exchange obligation", adopted in 2010,[102] imposed an increase in the power exchange share of all traded electricity up to 58% in 2011 and 61.8% in 2012. In 2012, only 33% of electricity was still sold over-the-counter.[103]

96 The source of this data is the Energy Regulatory Office for Poland, statistics 2013. More than 43% of the total costs of the TGC system in Poland between 2005 and 2012 (estimated at 5.3 bln PLN at the value of 2005) was spent on the support for biomass co-firing.

97 Główny Urząd Statystyczny (The Central Statistical Office), Energy from renewable sources in 2012, 2013.

98 Polska Grupa Energetyczna (translated as Polish Energy Group, commonly known as PGE) is a state-owned power company and the largest power producing company in Poland. Similarly to ČEZ in the Czech Republic, though not at the same level, PGE maintained its dominant position on the Polish energy market despite the market liberalisation that followed EU accession. PGE has a significant political clout and media impact.

99 Edith Bayer, Report on the Polish power system, Version 1.0., Agora Energiewende (2014).

100 The Energy Regulatory Office, National Report: The President of the Energy Regulatory Office in Poland, Warsaw, 2013.

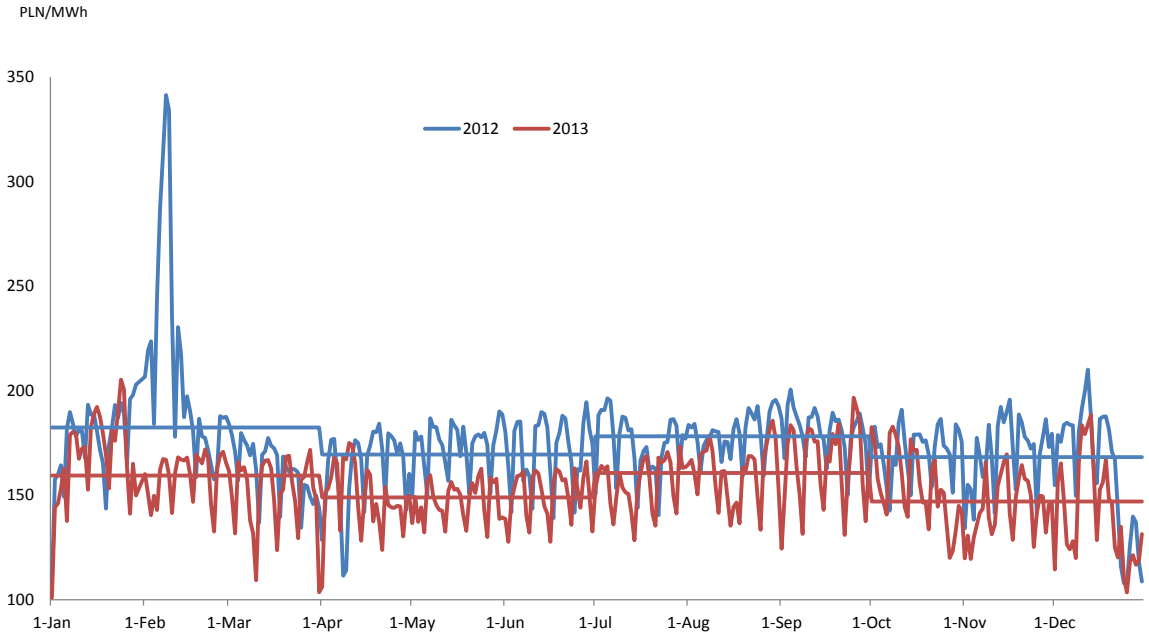
101 The source of these data is OECD Economic Surveys: Poland 2012, Climate change policies in Poland - minimising abatement costs. In Poland, investments in new generation are constrained by the capacity of the distribution grid. Under these conditions, generating companies belonging to the same holding as the distribution network operator may be in a privileged position.

102 Article 49a of the Energy Law obliges electricity utilities to trade at least 15% of electricity produced at the power exchange.

103 The Energy Regulatory Office, National Report: The President of the Energy Regulatory Office in Poland, Warsaw, 2013.

Electricity prices in Poland are characterised by significant variation among the individual market segments. Average electricity prices in 2013 were lower than in previous years for several reasons: a decrease in CO_2 emissions prices and in brown coal prices, increasing amounts of wind electricity in the system and a slight decrease in electricity demand.

Baseload spot market prices in Poland, 2012-2013



Source: The Energy Market Agency (Agencja Rynku Energii SA, ARE) data.

Although there is a correlation between energy prices in Germany and Poland, the impact of the German electricity market in Poland is limited.[104] Electricity trade between these neighbours is asymmetrical due to interconnection bottlenecks, among other factors.

3.2. The debate on the transit (loop) flows through Poland and the Czech Republic

The unplanned electricity transit flows (often, though not always correctly, called "loop flows") coming from northern DE into CZ and PL, and flowing onward to Austria and southern Germany are one of the prickliest energy-related issues between the three countries.

In two substantial studies in 2012 and 2013, the Transmission System Operators (TSOs) of the Visegrad states (CZ, Hungary, PL and Slovakia, hereafter the V4-TSOs) have argued that at times their transmission networks are so flooded with German electricity that their systems' stability is jeopardised, sometimes critically so.[105] The Confederation of Industry of the Czech Republic (SPČR) claims that in 2012 alone the country only narrowly avoided blackouts several dozen times.[106]

These claims received high-profile media coverage in CZ and PL, typically associated with the arguments that these flows are incurring costs to the transit countries which should be borne by the countries causing the transit, i.e. DE and Austria. This issue has become an irritant in relations between DE and its eastern neighbours.

104 OECD Economic Surveys: Poland 2012, Climate change policies in Poland - minimising abatement costs.

105 The positions of the TSOs of the Czech Republic (ČEPS), Hungary (MAVIR), Poland (PSE) and Slovakia (SEPS) are outlined in two studies: "Position of ČEPS, MAVIR, PSE and SEPS regarding the issue of Bidding Zones Definition" (March 2012) and "Unplanned flows in the CEE region" (January 2013).

106 Alexandra Mostýn, "Tschechien macht die Grenzen dicht", *LandesZeitung*, 5 June 2013.

What are transit flows and why do they occur?

To make this issue more understandable for non-specialists, it is necessary to introduce, in a simplified way, certain aspects of the electricity markets.

DE and Austria belong to a single electricity price zone. The electricity markets of CZ, Slovakia and Hungary are coupled, but each country has its own pricing zone. PL has its own electricity market.

Before further considering the spatial dimensions relevant to the transit flows, it is useful to look briefly at their temporal dimension. Some of the electricity is traded long-term, for instance, through futures contracts one year in advance. However, buyers and sellers cannot foresee all of the relevant factors that far in advance. Therefore, a substantial volume is traded just one day ahead. Recently, growing volumes have been traded in these intraday markets several hours before "real time" trading, i.e. before the electricity is actually generated, transported and consumed.

To maintain the stability of the power system, it is necessary that production and consumption be in equilibrium every second of the day. Therefore, the day-ahead market closes 12 hours before real-time trading, and intraday day markets close no later than 45 minutes before real-time trading.

After that, the system operator takes control of all the adjustments necessary to guarantee the stability of the system. There can be situations of undersupply, for instance, if demand is higher than forecast or if a generation unit stops working unexpectedly. In such situations, the system operator activates reserve capacities outside the ordinary market. In the event of oversupply, for instance, if demand is lower than expected or if a demand centre suddenly falls off the grid due to an accident, the system operator curtails certain generation units. These transactions occur outside normal electricity markets but produce financial transactions under special market or administrative rules.

Returning to the spatial dimension, within one price zone buyers and sellers make their transactions regardless of their geographical positions or possible bottlenecks in the grid. In other words, the electricity price is defined under the fictive assumption that within each price zone transmission capacities are unlimited (the so-called "copper plate assumption").

In reality, however, transmission capacities can at times be insufficient to accommodate the results of the transactions between market actors. For instance, the transmission capacities between northern DE and southern DE are often congested. This means that in order to implement the flows resulting from the transactions which took place in the power markets, more electricity should flow than the available transmission capacity, typically from north to south.

If DE were not connected to other countries, this disequilibrium would be balanced internally: some additional (i.e. more expensive than the strike price) generation units would be activated in the undersupplied region, i.e. typically southern DE and Austria, while an equivalent amount of production would be curtailed in the oversupplied region. The costs of these adjustments are borne by the system operator and then shared among all electricity consumers.

DE is not an island, however; it is connected to its neighbours. In ordinary (AC) power grids, electricity follows the path of least resistance, unless its flow is restricted by special devices like phase shifters. Therefore, transit flows through other countries can arise. In this case, electricity that cannot flow directly from north-eastern DE to Bavaria and Austria sometimes flows through PL and CZ.

Such situations typically arise at times of high wind and solar generation in the northeast.[107] A recent report by the consulting group THEMA on behalf of the European Commission argues that there are strong indications that loop flows are "correlated with high wind feed-in/power surplus in northern Germany". DE's "connection of significant amounts of renewable generation to the grid […] has led to increased loop flows in the areas surrounding Germany."[108]

Wind and solar generation alone is just one side of the coin, however. Even at times of high wind and solar production and low demand, DE is still far from a 100% renewable power supply. The increasing occurrence of negative prices in the German power market is also a symptom of the inflexibility of certain conventional power plants. A report by the Institute of Applied Ecology (Öko-Institut) argues that "loop flows occur not only when there are high wind-energy feed-ins," but also at other times when "generation from wind power plants was virtually negligible."[109] Another report by the Fraunhofer ISI observed that brown coal and nuclear power plants hardly react to very low or even negative electricity prices: instead of ramping down their production, they tend to continue generating as scheduled, and even prefer to pay in order to avoid the costs of shutting down and then restarting production.[110] It can be assumed that the

107 Ladka Bauerova and Tino Adresen, "Windmills Overload East Europe's Grid Risking Blackout: Energy:, Bloomberg, 26 October 2012.

108 "Loop Flows: Final Advice", THEMA Consulting Group, October 2013, 2.

109 Charlotte Loreck et al., "Impacts of Germany's Nuclear Phase-Out on Electricity Imports and Exports", Öko-Institut, 31 January 2013.

110 Johannes Mayer et al., Kohleverstromung zu Zeiten niedriger Strompreise, Fraunhofer-ISE (2013).

large brown coal capacities in CZ and PL, as well as the nuclear reactors in CZ, behave the same way. If all conventional plants were as flexible as open gas turbines, negative prices would not occur at the current level of renewables.

Whatever the cause(s), when electricity *en route* from DE to DE flows through other countries, it can be argued that DE is using the infrastructure of other countries. It would be easier to discuss possible adaptation measures on both sides of the border, and possible financial compensation if these flows were predictable. However, sometimes they are unplanned, mainly because solar and especially wind energy production cannot be accurately forecasted.

Interconnector capacities are tendered in annual, monthly, daily and intraday tenders. Intraday tenders are the shortest-term tenders and their auction closing time takes place 2.5 hours before delivery. For instance, if the price for the next day is lower in PL than in DE, the commercial flow is scheduled from PL to DE. However, if wind generation in northern DE is higher than expected, while at the same time demand in Austria and southern DE pulls electricity from neighbouring CZ, the physical transfer may flow in the opposite direction.

Unplanned cross-border flows arise when the commercial flows do not correspond to the physical flows. Since they are not scheduled, unplanned flows require rapid adaptation by system operators on both sides of the border. In this case, moreover, the unplanned flows are transit flows or almost loop flows, since they originate and end in DE, passing through other countries.

The Visegrad countries' TSOs call for splitting Germany/Austria into two pricing zones

Up to a certain extent, transit flows are normal in integrated transnational electricity markets. The Öko-Institut study argues that transit flows also occur regularly elsewhere in Europe (e.g. flows from France to Italy via DE and Switzerland). However, it must be noted that for the Czech grid, the current flows are relatively large compared to the overall system, while DE has a larger system that is better able to deal with the French transit flows.

However, the increasing frequency of these occurrences (and especially the intensity of the flows) worries the V4-TSOs. They complain that the (unplanned) transit flows severely strain their systems and undermine their internal electricity markets because these flows force the V4-TSOs to reduce their own tradable capacities in order to maintain the reliability of their systems' operation. This, in turn, limits the trading possibilities of other market players in the region.[111]

According to the V4-TSOs, this is essentially "freeriding", namely, the German and Austrian power systems (or their market participants) are using the transmission networks of other systems without participating in an allocation mechanism, coordinating with them or paying for the privilege. There are two types of costs incurred to the transit countries: costs related to security of supply and system services in the transit country, and costs stemming from reduced capacity for market trade within the host country or between the host country and other areas.[112]

"The scale of the problem," conclude the V4-TSOs,"is determined by the fact that in about 80% of the 2011-2012 hourly data population the safe level is exceeded."[113] These power flows can be up to three times the "safe level". "We view as unacceptable the situation where the greatest volume of cross-border transactions in the region is not considered to be subject to coordination under regional or European cross-border market rules. […] Successful implementation of the European integrated electricity market depends on the way the rules for the cross-border electricity market are aligned with the technical capabilities of the interconnected power systems. It is of utmost importance that cross-border trading arrangements are based on coordinated capacity calculation and allocation."[114]

According to the V4-TSOs, the crux of the problem is the structure of the regional price zones. DE regularly exports power to Austria, which is in the same price zone. However, about a quarter of that volume transits through PL and CZ *en route* to Austria. The V4-TSOs thus argue for splitting the single price zone of Germany and Austria. This would reduce the commercial flows from Germany to Austria, thus weakening the need for physical transit flows.

This proposal is part of a broader European debate. In 2013, the European Agency for the Cooperation of Energy Regulators (ACER) launched a public consultation on the influence of the existing bidding zones on electricity markets. ACER stated that "the question of bidding zones gained urgent attention due to the increasing amount of loop flows in

111 "Loop Flows: Final Advice", THEMA Consulting Group, October 2013, 2.

112 Ibid.

113 "Unplanned flows in the CEE region", January 2013, 22.

114 Ibid, 39.

some parts of Europe, which are considered to be a threat to the secure and efficient functioning of the market."[115] In its consultation paper, ACER also mentions the concept of nodal pricing, i.e. of dividing the power market into many smaller price zones. The consultation process is reviewing the design of the bidding zones.

In its submission to this consultation in September 2013, the influential German Association of Energy and Water Industries (BDEW) fiercely defended the appropriateness of the unified Austrian-German price zone. "[…] BDEW clearly urges relevant stakeholders to consider enlarging bidding zones rather than to propose market splitting. In the case of the German/Austrian bidding zone, we do see essential benefits in keeping/enlarging this zone."[116]

Apparently, this debate will continue, possibly with increased scope and intensity.

Possible solutions

There are various ways to solve or mitigate the problems linked to unplanned or unwanted transit flows. Some of these solutions would require measures to be taken mainly in DE; others require action in CZ and PL. All require greater mutual understanding between government, stakeholders and civil society in these three countries.

The transit flows can be made more controllable and predictable. Progress has already been made on this simply by improving cross-border communication between the TSOs. This helps to anticipate unplanned flows and to deal with them more efficiently. Moreover, phase-shifter transformers are being installed at the border between DE and PL. These devices, currently scheduled to be operational by 2016, make it possible to regulate and even cut off unwanted flows at critical times. Agreeing on the modalities of their operation, including future cost- and benefit-sharing, requires a deeper dialogue between TSOs, energy regulators and policy-makers.

In addition, three kinds of action can be taken on the German side. First, transit flow pressure can be mitigated by accelerating the construction of new north-south transmission lines within DE, as well as by the deployment of other sources of flexibility like demand response and storage. The more flexibility and transmission capacity is available inside DE, the less other countries are affected by the deployment of renewables in DE. Some of these transmission lines have already become operational and are arguably already having a positive impact. In its biannual 2013 report, the Czech TSO noted that "critical situations in the Czech transmission system were fewer in number and less serious compared to the corresponding period [January-July] of 2012".[117] Moreover, other planned grid expansion measures – like the high-voltage link between the Thuringia and Bavaria – are expected to be operational in three to four years.

Second, the German government as well as other stakeholders that promote the *Energiewende* should take the concerns of the Visegrad states seriously. Even though concerns about blackouts might be exaggerated, it is in DE's interest that the neighbouring countries develop a positive perception of the energy transition. Dismissing or ignoring relevant debates in neighbouring countries might be a short-sighted strategy. If DE regularly uses the power grids of its neighbours, then a contribution by DE to the costs of this infrastructure might be considered. Awareness-raising and technical support for the potential and economic benefits of increasing flexibility within the Czech and Polish systems would also be useful.

Finally, the idea of splitting the German/Austrian market into two zones could be considered. The Thema and the Öko-Institut studies mentioned above suggest that, if two pricing zones were created, the most appropriate demarcation would not be the German-Austrian border, but farther north in the middle of DE. A positive impact of split price zones would be a decrease in the production of lignite power plants, because it would lead to lower prices only in the northern zone where they are located. The congestion within DE would decrease and transit flows along with it. Polish coal-fired plants would also decrease their production due to lower prices in the northern German zone, thus improving the match between commercial and physical flows. Moreover, a market split would provide incentives for necessary investment into power generation capacities in southern DE, reducing the (possible) need for state intervention to ensure security of supply in that region.

However, it is clear that at the present time the idea of market splitting is not widely supported in DE. There are important drawbacks, such as political acceptance of having different wholesale prices within the same country, and especially the opposition of industrial and private electricity users in southern DE who would experience an increase in power prices (at least for a few years). Nevertheless, other countries like Norway and Italy have different price zones, and their experience could be discussed more intensively in the German debate.

---

115 See http://www.acer.europa.eu/official_documents/public_consultations/pages/pc_2013_e_04.aspx.

116 The contribution of the BDEW and of 31 other stakeholders can be found on the website of the ACER consultation mentioned in the previous footnote.

117 "Performance Overview for January to June 2013", ČEPS, 2013.

Whatever its outcome, a sincere German debate about these issues, taking into account the interests and concerns of the neighbouring countries, would certainly improve DE's image in the eyes of its neighbourhood. Without market splitting, the implementation of flow-based market coupling could also alleviate the problem by properly pricing transmission capacity.

On the Czech and Polish sides, investments in the electricity grid can increase the capacity to cope with transit flows. Moreover, some new debates would be beneficial. In these two countries, the energy policy debate is very much led by the energy producers. It is no surprise that the Czech and Polish generators are not happy about large amounts of very low marginal cost renewables in DE reducing power prices and their profit margins. However, cheap electricity from German solar and wind power is an opportunity for Czech and Polish consumers. If the power generation mix of these two countries could be made more flexible, Czech and Polish consumers would benefit from cheap solar and wind electricity during many hours of the year. Minimising imports of "excessively" cheap wind electricity from DE is in the interest of Czech and Polish power generators, not of consumers. In other words, by investing in flexibilising their power systems, Czech and Polish citizens and consumers could benefit from the *Energiewende* instead of being just transit countries.

3.3. Renewable energy support schemes

The Czech Republic's renewable electricity support schemes

CZ's support schemes for renewable electricity are currently in crisis, as 2013 legislation severely curtailed the main programmes. At the time of writing, the newly-formed Czech government had not yet signalled new developments in this area.

Since 2005, CZ has supported renewables through a combination of feed-in tariffs, a Green Bonus scheme, European Structural Fund monies. Originally, all renewable electricity generation technologies were eligible for support. In 2010, however, new legislation drastically restricted clean-energy support schemes, which will bring much of the country's renewable energy development to a halt by 2014.

In 2013, in a consultation document concerning the update of the national energy policy strategy,[118] the previous Czech government proposed a goal of only a 15% renewables share of electricity by 2040. This is extremely low, considering that the 2020 targets set by the National Renewable Energy Action Plan of 2012[119] are a 13.5% renewables share in gross final energy consumption and a 10.8% share in renewable energy sources in transportation, which suggests that the share in the electricity sector should be higher than 13.5% by 2020. CZ is currently on track to meet the 2020 goals.

CZ introduced feed-in tariffs and a Green Bonus Scheme in 2005. The schemes supported small hydropower, biomass, biogas, wind and solar PV for periods of 15 to 30 years, with the time span depending on the source. Producers could opt for either a feed-in tariff or a green bonus that was tacked on to the market price of electricity. The flaw was that the tariff for PV was re-set in 2009 using 2007 prices as a benchmark. By the time the programme began in 2009, there had been significant reductions in the cost of PV systems. The result was a feed-in tariff that guaranteed extremely high profit margins for PV-generated electricity. At the same time, the tariff for wind was too low, which contributed to a lack of substantial development in that sector.

The tariff regime encouraged major energy investors, such as ČEZ, to move aggressively into the PV sector. They did so quickly, assured of guaranteed high rates of return as a result of the delayed regulatory response. In 2010, 1.5 GW of PV was installed in CZ, ranking it third in the world for the highest newly-installed PV capacity that year.[120]

As a result, electricity wholesale prices were expected to decrease, but prices for final users were expected to increase, and this indeed happened in the following years. The feed-in tariff thus came under heavy political pressure and was abolished for larger systems and reduced by 50% for small systems. Moreover, a 26% solar tax was introduced on revenues from photovoltaic plants, which has had the same effect as a substantial retroactive change.

In 2013, an amendment to the Act on Supported Energy Systems was passed terminating the feed-in tariff for small-scale photovoltaic, thus stopping its development almost completely, while more gradually winding down incentives for other renewables. Wind and biomass generation projects that received construction permits in 2013 will still be eligible for feed-in tariffs as long as they are completed by 2015. The solar tax will be extended beyond 2013, but at 10% rather than 26%. Hydropower stations of under 10 MW will still receive government support.

---

118 "Aktualizace Státní energetické koncepce České republiky", Czech Ministry of Industry and Trade, September 2013.

119 "Národní akční plán České republiky pro energii z obnovitelných zdrojů", Czech Ministry of Industry and Trade, August 2012.

120 "Clean Energy Finance Solutions: Central & Eastern Europe", Cambridge Programme for Sustainability Leadership, March 2013, 12.

The poor design of the feed-in tariff for PV, retroactive changes to legislation and the subject of renewable energy in general have generated much criticism in CZ. The country's powerful fossil fuels and nuclear lobbies campaigned aggressively in support of restrictive legislation. Industry representatives welcomed the 2013 laws in the name of insuring the competitiveness of Czech companies, which they claim pay the highest prices in Europe for electricity.

However, the renewables industry, NGOs, the Czech Greens and many independent experts argue that incentives for investments in clean energy have been all but abolished, while the implicit or explicit subsidies for coal, gas, waste and nuclear persist. An appeal on behalf of several energy-progressive associations states: "In order to preserve the status quo and to avoid a radical modernisation of the energy sector, the Ministry of Industry and Trade plans to breach the limits on brown coal mining in north-western Bohemia, to expand uranium mining, to construct new nuclear reactors and to burn massive amounts of waste instead of recycling it."[121] Moreover, the state now faces about 40 lawsuits over its retroactive changes to, and abrupt cancellation of, the subsidies to photovoltaic producers.[122]

As seen in the previous chart, solar now makes up almost 3% of the Czech power generation mix, one of the highest shares in Europe. However, three-quarters of that capacity was installed in one year alone, 2010, through a strong top-down approach focused on large projects for large investors. This did not leave time for the gradual development of bottom-up market structures, including distribution chains, the training of installers and awareness-raising for potential small investors.

The future of renewable energy development in CZ is thus uncertain. On the one hand, there is considerable potential for renewables. Energy demand in CZ is expected to rise as the economy improves. Old coal-fired plants are scheduled to come offline. The falling costs of renewables, in particular wind and solar PV, make them cheaper than new nuclear already today, and will make them competitive with new fossil fuel power plants in the near future. Opinion polls show the public is open to renewable energy alternatives, particularly in the field of microgeneration, in the name of enhancing CZ's energy security.[123]

Yet in the short run at least, the public is sceptical about robust support schemes as a result of the overly generous tariffs that led to soaring energy bills. The partially state-owned big utilities, which see renewable energy as a threat, have close links to government circles that give them enormous clout. As argued by Czech experts in the trilateral dialogue, while ČEZ could and did create revenues with solar energy, this is not their core business and they seem to have a great interest in defending the current structure of the Czech electricity market rather than in seeing it change. As a matter of fact, the incumbent power generators never complained about the full stop of PV development this year. The on-and-off-again schemes, the retroactive tax on PV and the inconsistent political responses have hurt investor confidence in the renewable energy sector. Complicated, expensive licensing regulations make things all the more difficult for small-scale operators.[124]

Germany's renewable electricity support scheme (EEG)

The EEG has been the cornerstone of renewable electricity deployment in DE since its inception in 2000. Despite a number of amendments, its continuity has been remarkable. Its key elements are:

1. Electricity generated by renewable sources has priority access to the grid.

2. Costs are borne by electricity consumers, not by the public budget.

3. Simple implementation with low administrative burdens and low risks for investors, reducing capital costs and implementation times.

4. Stable, long-term feed-in payment differentiated by generation technology, plant size and other criteria. Originally this was a fixed feed-in tariff, but in recent years there has been a trend towards feed-in premiums on top of the revenues obtainable on the power market.[125]

---

121 Chamber for Renewable Energy Sources, CZBiom Civic Association, Czech Wind Energy Association, Czech Photovoltaic Industry Association, Union of Entrepreneurs for the Use of Energy Sources, Czech Geothermal Association, Centre for Research of the Lithosphere.

122 "MfD: Czechs, Europe should revise ineffective green policy", *Prague Daily Monitor*, 17 September 2013.

123 "Clean Energy Finance Solutions: Central & Eastern Europe", Cambridge Programme for Sustainability Leadership, March 2013, 29.

124 Ibid., 30.

125 See also Mark Fulton, Reid Capalino and Josef Auer, The German Feed-in Tariff: Recent Policy Changes. Deutsche Bank Group, 2012; Camilla Bausch and Michael Mehling, Strengthening Renewable Energy Expansion with Feed-In Tariffs: The German Example, Friedrich Ebert Foundation, in press.

The EEG had a predecessor law, adopted by a conservative CDU-FDP government in 1990. It introduced priority access in order to circumvent frequent obstruction by the integrated power monopolies, but the very low tariffs limited the deployment of renewables.

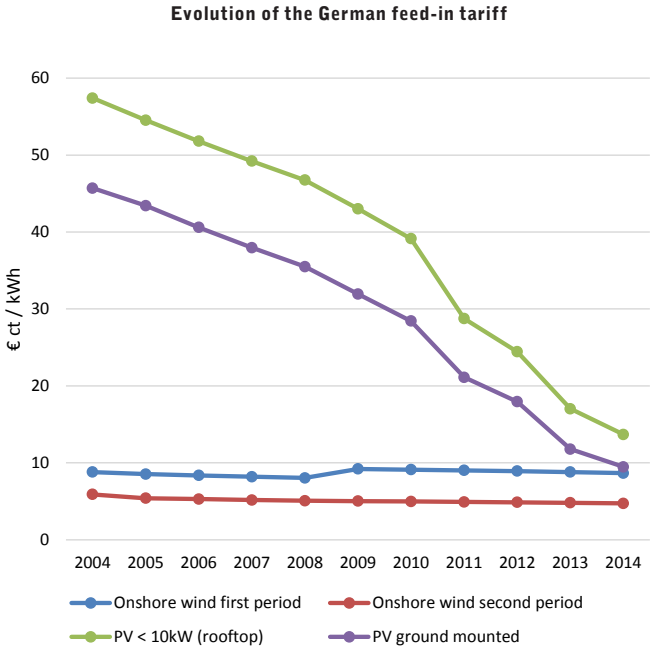
At the same time, wind power started booming in Denmark, thanks to its more attractive feed-in tariffs.[126] Cross-border learning provided DE with a clear example of how to promote renewables. The Social Democrat-Green government came to power in 1998 in DE and adopted the EEG in 2000. The EEG strongly increased differentiation between technologies, giving a boost to solar PV above all. The EEG also introduced the principle of an automatic degression of the tariff, successively complemented by a series of legislative adjustments.

The chart below shows the dramatic reduction of the nominal feed-in tariff for solar PV. Taking into account the 16.5% inflation from 2004 to 2013, the new PV systems installed in January 2014 receive 76% to 79% less tariff than those installed 10 years ago. The reduction for wind was less than for solar due to increased costs of its main raw material, steel.[127]

Nevertheless, taking inflation into account, onshore wind has lower lifetime generation costs today than it had 10 years ago.

Given the low operating costs of renewables (except biomass), capital costs have a large impact on total costs. Reducing investment risk is therefore crucial to reducing their cost. This has been one of the main reasons for the success of the EEG: a number of comparative studies show that the EEG and other feed-in tariff systems have led to lower specific costs for wind and solar energy than have more risk-intensive quota and tendering systems.[128]

However, by fixing prices and not volumes, a feed-in tariff entails the risk of triggering more or less investment than is desirable or planned. This risk of underinvestment exists also in quantity-based quota obligations, which have often failed to deliver the quota due to flawed designs, e.g. penalties that were too low. In any case, a feed-in tariff system needs regular monitoring and possibly adjustments as well. During some years, especially 2009 to 2011, the decrease in PV costs was even more rapid than the degression of the feed-in tariff, resulting in more installations than forecasted. To cope with this problem, the "breathing cap" was introduced for PV: within a defined growth corridor, the feed-in tariff decreases more rapidly in the event of more PV installations than expected and vice versa.



Source: Data from the German TSOs (www.kwk-eeg.de).

Recently, the costs of the EEG have been at the centre of the debate. From 2010 to 2014, the EEG surcharge, i.e. the costs borne by (most) electricity consumers for the EEG, increased from 2 to 6.3 ct/kWh. During the same period, electricity bills for households increased even more. Well-financed PR actions, media and political campaigns[129] depicted a future of ever-increasing electricity prices as a result of renewables, including calls for ending the EEG entirely. Since the Czech, Polish, and international press often report such arguments, it is worth addressing them.

126 "30 Years of Policies for Wind Energy: Lessons from 12 Wind Energy Markets - Denmark", IRENA, 2012.

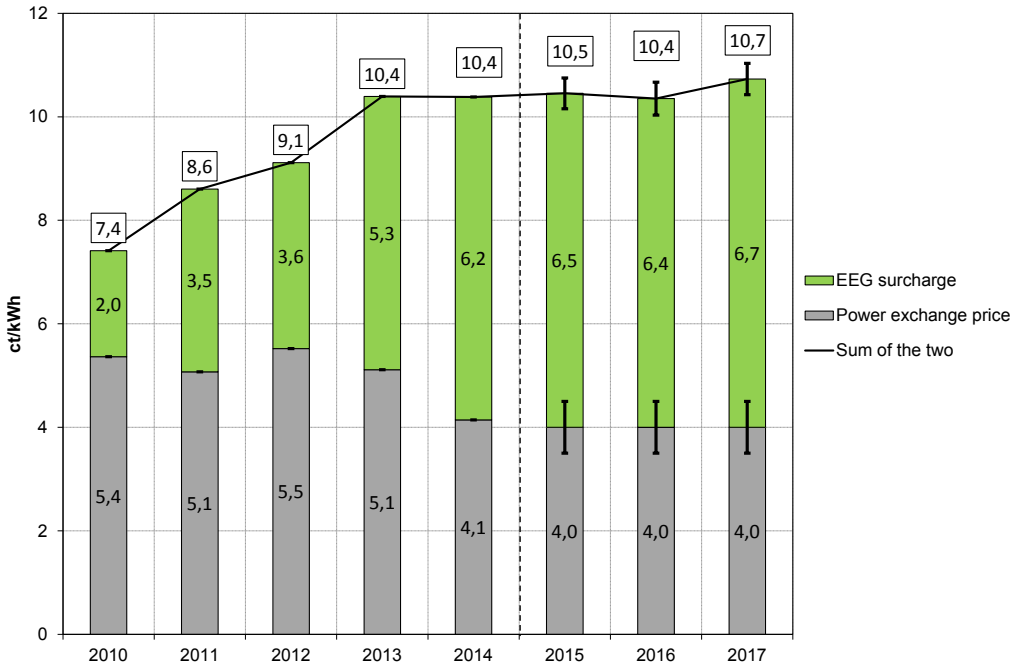
127 The values for wind are not exactly comparable due to the evolution of various additional rules and premiums. For onshore wind, the EEG provides a higher tariff during the first years of operation, and a lower one after a certain number of years depending on the yield of the wind plant in that specific location. A number of further special rules exist. The data refer to the tariff valid for plants which began operation in the first month of each year. The feed-in tariff is due over 20 years and is not indexed.

128 Simone Steinhilberet al., "Indicators assessing the performance of renewable energy support policies in 27 Member States", D17 report of the EU project "RE-Shaping: Shaping an effective and efficient European renewable energy market".

129 For instance, the Initiative for a New Social Market Economy (INSM), a neoliberal think tank financed by the employer associations of the metal and electrical industry (see http://www.insm.de/en/The-INSM/the-insm.html and a critical review at https://lobbypedia.de/wiki/Initiative_Neue_Soziale_Marktwirtschaft), launched a nationwide "Stop the EEG" campaign. One of the slogans was "Stop the power price horror" represented by a devil.

First, the EEG surcharge is heavily influenced by the difference between the feed-in tariff received by the renewable electricity generators and the sum obtained by the TSOs selling the EEG-supported electricity on the spot market. The prices on the spot markets decreased substantially for several reasons: decreasing prices of CO_2 emission certificates and coal, relatively low demand and the impact of renewable electricity.

Forecasted Development of EEG Surcharge and of Power Exchange Price



Source: Öko-Institut (2013).[130]

Low-marginal-cost solar and wind are displacing power plants with higher marginal costs, reducing prices at the power exchange. This is called the merit order effect. In fact, due to the strong production from solar, the German power exchange has undergone a historic change during the last few years from regular midday peak prices to frequent midday low prices on sunny days. The average spot market price in 2013 was EUR 16/MWh lower than in 2011 (see more info in section 3.1 above). On top of this, due to PV generation, the spot market price between 11 a.m. and 7 p.m. declined by an additional EUR 6/MWh during the summer of 2013 alone.[131]

The chart above shows the aggregated effect of the EEG surcharge and of the reduced-exchange power market price since 2010 and forecast until 2017.

Two important conclusions can be drawn from this study:

- More than half of the increase in the EEG surcharge from 2012 to 2014 was due to the decrease of power exchange prices, which was largely a consequence of increased renewables generation and is a benefit for large electricity consumers buying at the power exchange.

- Considering the sum of the power exchange prices and the EEG surcharge, the aggregated costs increased by only EUR 0.03/kWh and are not forecasted to further increase significantly in the coming years, even in the event of a continued strong deployment of renewables.

130 Charlotte Loreck et al., Analyse der EEG-Umlage 2014, (Kurzstudie im Auftrag der Agora Energiewende, October 2013).

131 BDEW, Foliensatz zur Energie-Info: Kraftwerksplanungen und ökonomische Rahmenbedingungen für Kraftwerke in Deutschland, Kommentierte Auswertung der BDEW-Kraftwerksliste 2013 (16 August 2013).

Explaining the background of these two conclusions requires a deeper analysis. The counter-intuitive forecast that the EEG surcharge will stabilise in the coming years (see chart above) requires some explanation. This forecast is not based on the assumption that renewable deployment will stop. To the contrary, it assumes that the PV capacity target of 52 GW will be reached in early 2018, and that the deployment of relatively expensive offshore wind continues as planned before the new German government lowered the targets at the end of 2013.

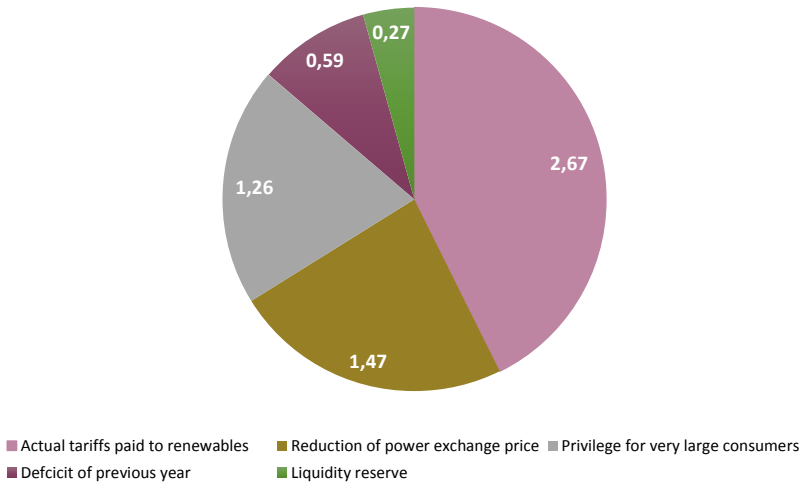
On the one hand, the prices at the power exchange will not decrease further on average, as they are already very low. Moreover, fossil and nuclear capacities will be withdrawn from the market in the coming years.

More remarkably, the costs incurred by additional renewable capacities installed from now on are substantially lower than in the past. According to the assumption of this study, from 2018 on, 37% of German solar production would come from systems installed in 2013 or later, but these systems will incur only 13% of the total cost of solar production. In other words, from now on investments into renewables are so cheap that they will not significantly influence the total costs of the EEG.[132]

The following chart helps understand the background to the first conclusion: Currently, the decrease in the power exchange prices accounts for 24% of the EEG surcharge. The privileged treatment of large electricity users accounts for 20% of the costs, 9% is caused by forecast errors in previous years and 4% is used to set aside a reserve to outweigh such errors in the future.

Only 43% of the EEG surcharge is directly incurred by payments received by renewable electricity generators, as shown in the chart below.

Components of the EEG surcharge 2014 (total: 6.24 ct / kWh)



Source: German Renewable Energy Association, BEE.[133]

The privileged treatment of large power consumers has come under growing pressure from both consumer groups and actors in the renewable energy sector concerned about the burden on households and small businesses.

Moreover, in December 2013 the European Commission launched an "in-depth inquiry" into this privilege for large power consumers. The Commission announced that it will "[…] carefully examine whether the reductions for energy-intensive companies can be justified and whether they are proportionate and do not unduly distort competition."[134] The coalition agreement of the new German government announced it would redesign the exceptions for energy-intensive industries.

Whatever the outcome of this controversy, the EEG's success, cost-effectiveness and relative simplicity have inspired policy-makers in dozens of other countries who have adopted similar schemes for promoting renewables in their countries.

---

132 Charlotte Loreck et al., Analyse der EEG-Umlage 2014, (Kurzstudie im Auftrag der Agora Energiewende, October 2013), 23-25.

133 Bundesverband Erneuerbare Energie e.V., Hintergrundpapier zur EEG-Umlage 2014, (October 2013).

134 European Commission, IP/13/1283, Press Release of 18 December 2013.

Poland's renewable energy support schemes

According to a study by Greenpeace,[135] in 2010 PL exploited only 7.8% of its domestic renewable energy potential. Large-scale wind has high development potential, especially in northern Poland close to the Baltic Sea coast. Small-scale wind has significant potential in many areas of the country.[136] Another high-potential sector is biogas, not only because of the synergies with the strong Polish agricultural sector, but also because Polish companies have the technology for building complete biogas systems. In some areas, there are also good conditions for small hydro and geothermal development. With average solar radiation comparable to DE's and favourable conditions in terms of availability of space, PL also has a large solar energy potential.

PL's official energy policies[137] stress the need to become more energy-efficient and recognise that renewables can contribute to the goal of diversifying the country's energy supply sources. However, the role of renewables in PL's energy strategy is limited to the bare minimum required by the EU (see section 1.2. above).

PL has adopted a National Renewable Energy Action Plan, and claims to have implemented the EU Renewables Directive. However, in March 2013 the European Commission referred Poland (and Cyprus) to the European Court of Justice for failure to fully transpose the Directive.[138] The case is still pending. In the meantime, Poland has adopted new legislation, but it is not clear if it will be deemed to be in line with the Directive on renewables.

Besides possible legal implications at the EU level, domestic critics argue that the implementation of renewable policies has been consistently weak in Poland. The most frequent comment is that the design of the tradable certificate scheme led to very favourable conditions for the co-firing of (largely imported) biomass in coal power plants. In 2012, biomass co-firing constituted nearly half of what is declared as "renewable generation" in Poland (see the chart in section 3.1. above). Critics argue that biomass co-firing supports the continuation of the existing coal power infrastructure, and that largely imported biomass does not help Poland develop its own sustainable energy supply system. Moreover, biomass co-firing was a main reason for the collapse of the prices of the green certificates in late 2012/early 2013.

Under these conditions, wind deployment began but remains at low levels. At the end of 2012, Poland's wind capacity was 2.5 GW.[139] This compares to 4.8 GW in the neighbouring German Federal State of Brandenburg, which features comparable conditions but less than a tenth of Poland's surface area. Almost no solar PV capacities have been installed in Poland. If current conditions for the further growth of renewables in Poland remain inadequate, it is doubtful whether PL will reach its 2020 targets.

Since 2005, renewable electricity investments in Poland have been supported mainly through a quota system based on tradable certificates (GC). The law obliges electricity companies producing or selling electricity to end users, as well as some other market players, to achieve a certain amount of renewable energy in their used or supplied electricity. In 2014, this amount is 13% (and it was 12% in 2013). In order to demonstrate that they have reached the quota, companies must acquire a GC issued to the producers of renewable electricity. One GC corresponds to 1 MWh. Alternatively, the contracted parties can pay a so-called substitute fee, which in 2013 amounted to PLN 297.35 (circa EUR 70.7)/MWh. The prices of green certificates normally remained close to the cost of the penalty for those without certificates. However, at the beginning of 2013 the prices drastically declined because of the large amounts of certificates originated from the co-firing of (often imported) biomass (among other reasons). In February 2013, the GC price fell to a record low of PLN 100 per MWh (EUR 23.8), approximately one-third of the substitute fee designed for that year.[140]

Besides the green certificate scheme, producers of electricity from renewable energy sources are exempt from tax on the sale and consumption of electricity, which amounts to PLN 20 (approx. EUR 5) per MWh. A special feed-in tariff for small installations was introduced in 2013. Operators of installations using renewable energy sources with a capacity of up to 40 kW that are selling their generated electricity to an electricity supplier receive 80% of the previous year's electricity market price. This amount is considered too low to constitute a real incentive. For more than two years, the Polish Ministry of Economy has been working on a draft Law on Renewable Energy Sources. The first draft was published in December 2011, but after harsh criticism it was substantially changed. The second draft appeared in

135 Institute for Renewable Energy IEO and Institute for Technical Thermodynamic DLR: Energy [R]evolution – a long-term scenario for clean energy supply in Poland. Greenpeace, 2013.

136 "Clean Energy Finance Solutions: Poland", Cambridge Programme for Sustainability Leadership, March 2013, 34.

137 Such as the "Energy Policy of Poland until 2030" (2009) and the "National Renewable Energy Action Plan" (2010).

138 WNP: KE pozywa Polskę do Trybunału UE za dyrektywę o OZE. 21 March 2013

139 European Wind Energy Association, Wind in Power: 2012 European Statistics.

140 Gram w Zielone: Ceny zielonych certyfikatów znowu w dół. Polski system wsparcia dla OZE wymaga reanimacji. 21.06.2013

October 2012. This version included the introduction of a high feed-in tariff for small installations and a significant amendment to the quota scheme introducing technology-specific coefficients.[141]

However, in 2013 the Prime Minister's office took over the dossier and revised the draft legislation again. The third draft was published in November 2013. After a short consultation period, the last and nearly unchanged draft of 31 December 2013 was published. This version also introduces a new support scheme – an auctioning scheme.

According to this concept, the existing quota scheme should continue and apply to already-existing plants for 15 years after their commissioning. Operators of existing RES plants can choose between green certificates and the auction system. There will be three tendering categories depending on plant capacity. The winner of the tender will be the operator who commits to deliver a certain amount of electricity for the lowest price, which will represent a guaranteed feed-in tariff for 15 years.[142]

Support for biomass co-firing is planned to decrease. The electricity produced in co-firing plants would receive only 0.5 green certificates (instead of 1) per MWh, and this only for the average amount of electricity produced in 2011-2012.

Some Polish proponents of renewables see the potential to change the country's energy debate from the bottom up through a "prosumers" movement. There appears to be avid interest in Poland for the idea of small-scale production, or "microgeneration"[143] oriented to personal consumption, which is also a response to rising costs and the deteriorating quality of the power supply. A 2012 IEO survey, for example, showed that those most interested in investing in microgeneration are farmers (56%), young people (57%) and private entrepreneurs (70%). The technically proven, economically viable potential of RES-based microgeneration was estimated at 2 GW electric and 23 GW thermal by 2020, with a potential of creating up to 54,000 jobs, 15,000 of which would be in equipment manufacturing.[144]

Polish pro-renewables groups have long been advocating laws that would make microgeneration possible and lucrative for small-scale investors, homeowners and farmers. The legislation would allow individuals to use small-scale, self-installed facilities to sell power surpluses to the grid without having to obtain state licences to function as a utility.[145] According to the IEO, 9% of the Polish renewable energy scenario could be met by small-scale prosumer installations. The most important condition of and guarantee for the implementation of the plan to develop microgeneration and prosumer activity, says the IEO, is the removal of legal barriers and the adoption of new legislation for renewable energy sources.

141 Anna Pobłocka, Poland's new RE law to boost PV, but boom and bust fears exist. *PV-Magazine*, 31 August 2012

142 Maciej Szambelańczyk, Co nowego w kolejnym projekcie ustawy o OZE?, 14.01.2014, Rynek Energii Odnawialnej.

143 This concept includes an array of small-scale energy technologies, such as solar thermal collectors, biomass boilers, micro wind turbines, photovoltaic microgeneration, cogeneration microgeneration fuelled with biogas and bio-liquids (powering electricity generators with various internal combustion engines), heat pumps and small hydropower plants.

144 Institute for Renewable Energy, "The Development Plan for Microgeneration for Poland based on Renewable Energy Sources until 2020: A Synthesis".

145 Markus Trilling, "Polish citizens to help meet country's energy needs", *New Europe*, 6 August 2013.

4. EU energy policy – integration, cooperation or isolation?

In terms of energy policy, CZ, DE and PL are linked in a complicated patchwork of shared governance that includes strong elements of national governance, important elements of shared governance at the EU level and specific elements governed bilaterally or at the macro-regional level.

EU governance: With the Lisbon Treaty in 2009, energy policy has become a shared competency of the EU and its member states. However, the member states have the right to decide for themselves on the structure of their domestic energy supply. Despite this meaningful restriction for EU policy-making, important aspects of energy policy directly or indirectly fall within the EU's mandate.

The EU ETS, for example, was intended to be the EU's main tool for reducing carbon emissions. If the price of emissions grows sufficiently, price signals could strongly influence and shift incentives to (not) invest in specific technologies and thus influence the member states' power generation mixes.

The Internal Energy Market (IEM) for gas and electricity is regulated at the EU level. The impetus for liberalisation and unbundling came from this competency. On many related issues, the member states have transferred substantial shares of their sovereignty to the EU level. For instance, the freedom of the member states to provide state aid for energy sector investments is limited by EU law and by its interpretation through European institutions, such as the Commission and the European Court of Justice.

The EU Renewables Directive of 2009 requires the member states to satisfy an agreed proportion of energy consumption with renewable sources such that the EU as a whole shall obtain at least 20% of total energy consumption from renewables by 2020. The directive constituted the cornerstone of the EU 2020 Climate and Energy Package, which stipulated that DE's target is 18%, CZ's 13% and PL's 15%. Moreover, the directive defines a number of rules concerning the definition, promotion and system integration of renewables. It is the member states that decide how renewable energy support schemes are constructed and the preferences for different renewable energy technologies, as well as their share in electricity, heating/cooling and transportation.

The Large Combustion Plant Directive applies to combustion plants with a thermal output of 50 MW or more. Its aim is to reduce acidification, ground-level ozone and particles in Europe by controlling emissions of sulphur dioxide, nitrogen oxides and dust from large combustion plants at power stations, petroleum refineries, steelworks and other industrial processes running on solid, liquid or gaseous fuel.

Gas and power grid planning is a national prerogative but is increasingly being coordinated at the European level (see "National" below). Furthermore, incentives for certain infrastructure projects are set at the European level in the form of "projects of common interests" (PCIs). These are key infrastructure projects that have been identified to help member states to integrate their energy markets. They are also designed to "enable the power grid to cope with increasing amounts of electricity generated from renewable energy sources and consequently to help reduce CO_2 emissions."[146] Currently, 248 PCIs have been identified, most of them transmission grid lines for gas and electricity. These projects not only benefit from accelerated planning and permitting procedures, but can also receive financial support. The PCI list of October 2013 also includes cross-border projects for our three countries.[147]

Macro-regional level: There are "coupled energy-only markets" in some areas of the common market. The object of European power market coupling is to integrate transmission allocation and power trading across borders, and eventually to create a single electricity market with one price for power.

Bilateral: Within the EU, very few aspects of energy policy and the business of energy are (or can be) conducted bilaterally. This is also the case between DE, CZ and PL. The main exception constitutes investment decisions regarding infrastructure connecting two countries, such as power grids and gas pipelines. Although the expansion of cross-border transmission capacities is an objective of European policy, it is up to the national regulators and to the (often national) TSOs to decide among themselves where interconnectors will be placed and, in part, how to operate them. It should be noted that there are cooperation mechanisms stipulated in the renewable energy directive but they have not been used.

146 European Commission, Questions and Answers: Projects of Common Interest in energy, available at http://europa.eu/rapid/press-release_MEMO-13-880_en.htm, last accessed January 2014.

147 The list can be accessed here: http://ec.europa.eu/energy/infrastructure/pci/doc/2013_pci_projects_country.pdf.

National: Despite decades of European integration, there remains significant dissonance in the energy policy discourse of EU member states. On crucial issues like the future energy mix, it might even increase. One example constitutes the prevailing views on climate change and renewables in DE as compared with PL, CZ and certain other countries. Another example is how broadly the British political elite accept massive subsidies for new nuclear plants, whereas many other EU countries are either actively phasing out nuclear or simply not promoting new nuclear facilities.

Not only the debates, but also a substantial share of policy-making, implementation, and regulation in the field of energy happens at the national level. There are three examples of this from the electricity sector. First, grid planning is largely a national process with still very weak elements of European coordination; grid investment decisions hinge upon approval by national regulators and are financed by grid charges defined by national regulators and paid by national energy users. Second, over the last decade a large share of the total investment in the power sector has gone into renewable generation facilities, triggered by support schemes defined and implemented at national level. Third, security of the power supply is perceived by the public as a responsibility of national governments; several countries are currently introducing dedicated policies (capacity mechanisms), thus further increasing national say-so.

Two decisive Europeanised elements of governance are the Internal Electricity Market and the EU ETS. However, for very different reasons, in recent years both have lost influence in terms of their ability to determine investments into electricity generation facilities.

Due to low prices, the EU ETS plays virtually no role at all in influencing investments into new generation capacities; unfortunately, "backloading" will not significantly change this situation. The very fact that the EU ETS is regulated only at the EU level strengthens those groups interested in maintaining the status quo (extremely low prices). The opposition of just a few countries, typically led by PL, is sufficient to block significant reform.

At the same time, the energy-only market – which is at the core of the Internal Electricity Market – is currently unable to trigger investments in many parts of Europe. Under these circumstances, an increasing share of the investments into generation capacities is mainly determined by national policies such as renewable or combined heat and power (CHP) support schemes, capacity mechanisms and possibly subsidies for nuclear in the UK.

On the other hand, as mentioned above, the electricity market coupling initiative – a strong mechanism for integration – is underway. Moreover, the creation of new EU-wide institutions has just started and might develop a new dynamic. Key roles will be played by the Agency for the Cooperation of Energy Regulators (ACER) and the European Networks of Transmission System Operators for Electricity and Gas, respectively (ENTSO-E and -G). The idea is to develop network codes with a view to harmonising, where necessary, the technical, operational and market rules governing EU-wide electricity and gas grids and to start a coordinated grid planning process across the EU.

The 2030 Framework

In 2014, the topic of the day – and the overwhelming policy priority – is the formulation of the EU's 2030 framework.[148] The overarching issue up for discussion is the existence of European targets (as opposed to only certain member states setting their own national targets), and if so, their nature (only climate, or also renewables and efficiency, binding or non-binding), as well as the level of ambition for each of these areas. Other issues include the reform of the EU ETS, additional support measures for demonstrating carbon capture and storage, the continuation of the NER300 programme and measures to prevent carbon leakage, among others. Here again, there is a lack of harmony between PL, CZ and DE on the nature of the next step.

PL, CZ and DE are looking at the same questions addressed in the 2030 energy and climate agenda, but in very different ways. In light of this, these three countries exemplify the challenging negotiations currently facing the EU. However, strong EU targets are a necessary – though not sufficient – condition for the success of international climate negotiations.

The current Czech position, for example, is that there should be no binding targets for renewable energy or energy efficiency in the 2030 guidelines. Decision-makers argue that the EU ETS is working and thus not in need of revamping. Moreover, they argue that the principle of "technological neutrality" be respected, namely, that all technologies that are low- or zero-carbon (including nuclear) be considered a potential part of the solution.

The current Polish leadership sees the situation in much the same way as the Czech political elite. In terms of climate protection, Warsaw wants no decision on targets before the summit in 2015. In the same vein, it demands that carbon leakage and "imported" emissions play a central role in emissions trading. Like the Czech government, it argues that

148 "Green Paper: A 2030 Framework for Climate and Energy Policies", European Commission, March 2013.

"security of supply" should be the guiding priority in investment into new electricity generation capacity. In other words, investment in non-renewables like coal, nuclear and shale gas can be legitimate aspects of an energy security strategy. PL also maintains that "each mechanism to support production capacity should include any impact that the intervention may have on neighbouring member states and their internal energy market."[149]

DE's position is particularly complicated. In general, there is disagreement about the Europeanising of DE's ambitious energy transition. There is one strand in DE which argues that DE's priority should be for DE to retain as much freedom as possible to define its own (renewable) energy policies in order to make rapid progress on the energy transition. This faction opposes in particular initiatives aimed at harmonising support schemes at the EU level. From this point of view, the expansion of EU competences in energy policy is sometimes perceived as a threat to progressive, far-reaching renewable energy support schemes.

Moreover, some Germans see their neighbours to both the east and the west as incorrigible devotees of nuclear power and coal who will never change their colours, EU legislation or not. This current thus prefers for DE to go it alone, becoming a trailblazer in renewable energy production that other countries – in the EU and beyond – will voluntarily follow. Under this logic, investing political energy to advance ambitious EU 2030 renewables targets may not be seen as a priority. Interestingly, this kind of position coincides with those parties which are rather critical of renewables expansion: business players argue against a renewables target at the EU level claiming that the combination of targets leads to inconsistencies within climate and energy policy, and asserting that a "realistic" greenhouse gas emission target combined with the EU ETS would be their preferred policy approach.[150]

Another point of view, however, prioritises coordinating and integrating energy-related issues between DE and its fellow member states. DE, integration proponents argue, is the single most important EU player, and therefore has plenty of means to make its mark on common policies. Moreover, most of the goals of the German *Energiewende* are achievable only with an all-EU or global vision, e.g. enhancing flexibility, developing storage capacity, reducing costs. The EU 2020 renewables targets had positive effects on Germany too: they enlarged the export markets for technologies and services often made in DE, they helped welcome economies of scale in the PV industry and others, and they strengthened the pro-*Energiewende* discourse in DE by showing that the rest of Europe is indeed following a similar path. Moreover, reduced consumption of fossil fuels and nuclear in other countries improves the environment in DE as well. Lastly, there is an urgent need for more – not less – engagement on DE's behalf to convince its neighbours to embrace energy transitions and to act as key players in the EU arena.

DE's energy policy at the EU level thus has three options. One is to aim at exporting the energy transition, motivating and pushing other countries and the EU as a whole to promote renewables and energy efficiency, and actively trying to oppose new nuclear in the EU debate. A second option is to develop a narrower national concept without the ambition to promote the energy transition at the European level and with the aim of hindering the EU from interfering with the national development of the *Energiewende*. This option is basically "Leave us alone. You can do whatever you want to do at the EU level, as long as it doesn't interfere with our national concept." A third option is that German opponents of the *Energiewende* use the EU level to limit its speed and scope. (DE's big utilities, for example, traditionally call for "EU harmonisation" when what they actually mean and desire is the abolition of renewable energy supports.)

It should be stressed that in terms of renewable energy targets, DE's role is crucial for the 2030 strategy. All of the member states are looking to German positioning regarding renewable energy targets. Therefore, the announcement by the new German Economy Minister, Sigmar Gabriel, and the new Environment Minister, Barbara Hendricks, asking for a binding 30% renewables target for 2030 was an important signal.[151]

149 http://ec.europa.eu/energy/consultations/20130702_green_paper_2030_en.htm

150 See for example the press release of the German Business Association: BDI, BDI fordert konsistente Klima- und Energiepolitik, 25 June 2013.

151 Federal Economy Ministry and Federal Environmental Ministry, Common Press release, "Gabriel und Hendricks: Europäischer Klimaschutz braucht klare Ziele für den Ausbau erneuerbarer Energien", 15 January 2014.

Annex: Facts about the German *Energiewende* (energy transition)

The perceptions and views of Germany's *Energiewende* in Poland and the Czech Republic are by no means hegemonic or only negative. Nevertheless, the trilateral expert workshops revealed that a number of misunderstandings could be avoided through better information.

Some of the most common misperceptions are briefly addressed here:

1. **The nuclear phase-out and the decision to embark on the *Energiewende* were a sudden decision in the aftermath of the Fukushima accident in 2011.**

Neither DE's nuclear phase-out nor the goal of a low-carbon energy system based on renewables was a sudden decision in the aftermath of the Fukushima accident. In 2000, all four of Germany's nuclear power plant operators signed a deal with the federal government that foresaw a total nuclear phase-out. Its pace was comparable to the current settlement, though structured differently. Also, long-term targets for emission reductions and renewables were in place before Fukushima.

What has changed substantially is the nature of the political consensus. The first nuclear phase-out was pushed by a coalition of Social Democrats and Greens. The nuclear utilities signed an agreement to avoid harsher anti-nuclear measures, but they boycotted its implementation: instead of gradually closing down the older plants, they "irrationally" transferred generation permits from more modern and cheaper plants to older ones. This only made sense because the nuclear plant operators were speculating that a future conservative government would reverse the phase-out plan. This tactic seemed to be successful in 2009: a centre-right coalition of Christian Democrats and Liberals came to power which prolonged the lifetime of Germany's nuclear plants in September 2010.

After the Fukushima accident, the same centre-right government opted for a second turn-around. In 2011, the nuclear phase-out law was approved by more than 80% of parliament. The only party voting against the bill did so because it wanted a more rapid phase-out. The breadth of this consensus today makes the reversal of the nuclear phase-out unthinkable.

2. **The sudden closure of large nuclear power plants in 2011 was not discussed with the neighbouring countries in advance and endangered their supply security.**

It is true that the decision to shut down seven nuclear power plants in the aftermath of Fukushima was communicated abruptly to domestic and foreign stakeholders and was not negotiated with other countries. This was criticised, in that it posed an acute danger of power supply scarcity in DE and neighbouring regions, and that it would increase power prices in DE and beyond its borders.

Certainly, the lack of consultation with the other countries was not a model of inclusive diplomacy, and several German leaders publicly apologised afterwards.

However, these decisions did not really endanger supply security, as DE had large over-capacities for power generation. Wholesale power prices in Germany fell during the following years (see Chapter 4), and DE's electricity exports increased. The generation reserves in Central Europe became tight only for some hours during the coldest days of the extreme 2011-2012 winter. During those hours, however, DE exported to France, not least thanks to good wind generation.

3. **Germany's opposition to nuclear energy is a result of "German angst".**

One could also argue the opposite: regardless of nationality, those without the courage to embrace the transition to a sustainable energy supply suffer a deep denial of reality (finite fossil fuel resources, climate change, nuclear risks, wars fought over energy). Should this be attributed to a phobia against new ideas and technologies?

Instead of psychologising political choices, it is wise to remain on the solid ground of facts. Germany is not the first country to phase out nuclear power. Austria and Italy abandoned nuclear decades ago, as did Lithuania and Kazakhstan more recently. A number of other countries have opted not to pursue nuclear programmes. Only 31 countries in the world actually use nuclear energy, some of them mainly for military reasons. Like DE, several countries (e.g. Switzerland, Belgium) are phasing out nuclear. Many others are *de facto* abandoning nuclear, as no (or not enough) new plants are being built to replace those that will go offline in the coming decades.[152]

Risk perception is only one reason to avoid nuclear. Even more compelling are its prohibitive costs. According to the deal negotiated by the UK government with EDF to build two new reactors, their electricity will cost significantly more than the electricity produced by the new wind or large-scale solar plants installed in DE from 2014 onwards.[153] Then there are the incalculable costs of radioactive waste management over the coming millennia to consider as well.

Since the 1970s in DE, certain high-level nuclear engineers have "changed sides" and joined the anti-nuclear movement.[154] This helped the German public gain direct insight into nuclear technology and may have contributed to greater perception of the risks of nuclear in DE than in other countries. This is reflected in the rules about the liability limit for nuclear plant operators in the event of major nuclear accidents. In DE, this limit amounts to EUR 2.5 billion, by far the highest in Europe. In CZ, it amounts to EUR 232 million, and in the UK only EUR 157 million. DE may be 10 times better protected (financially), but this limit is still astronomically low when compared to the estimated actual damages of EUR 187 billion for the Fukushima accident or EUR 450 billion for Chernobyl.[155] Keeping liability low reduces the insurance costs of nuclear plant operators, leaving society financially unprotected in the event of accident. In the face of real dangers, a small portion of fear (be it "German angst" or not) may be very healthy: denying the severity of a risk does not extinguish it.

Finally, DE has convincing alternatives to nuclear power.[156] Self-confidence in the capacity to manage the transition to a power supply based on renewables is probably the opposite of what some people like to call "German angst".

4. The *Energiewende* is nothing but a burden to Germany's economy.

Energy efficiency measures and renewable energies require upfront investments, but they decrease the running costs of supplying energy. Sometimes, the critics of the *Energiewende* focus only on the costs and do not consider the benefits. The investments needed for the energy transition are significant. However, the costs should not be viewed in isolation from the benefits, and both should be compared with the costs and benefits of alternative energy scenarios.

Germany has benefited in many ways from the clean energy transition. It has, for example, created a renewable energy sector that employs 377,800 people,[157] many of them in the poorest regions of eastern Germany. This is nearly double the whole fossil fuel sector, including coal mining.

Indeed, some of the PV-panel manufacturing jobs were lost when inexpensive Chinese panels flooded the German and international market. Moreover, the big utilities that formerly controlled the German energy market have been forced to shed jobs. However, local energy production keeps billions of euros of added value in German communities, reduces Germany's reliance on foreign imports, and creates tax revenue for the state. In 2012, the sector attracted EUR 19.5 billion in investment.[158] In 2011, it has been calculated that Germany was able to replace EUR 10 billion in foreign imports with renewable energy made in Germany.[159] The industry's 2012 turnover,

---

152 Mycle Schneider, Antony Froggatt et al., World Nuclear Industry Status Report, 2013.

153 See footnote 49, Chapter 1.

154 Paul Hockenos, "Angst or Arithmetic? Why Germans are so Skeptical about Nuclear Energy", Heinrich-Böll -Stiftung, 11 May 2012.

155 All these figures stem from the European Commission, Public Consultation "Insurance and compensation of damages caused by accidents of nuclear power plants (nuclear liability)", 2013.

156 See a series of reports by experts commissioned in 2010 by the Heinrich Böll Foundation under the name "Myth of Nuclear Power: A Guide".

157 In 2012, 377,800 people were employed in the manufacture, operation and maintenance of renewable energy facilities, in the supply of biomass and biofuels for transport, in the inputs and service industries supplying these sectors (total of 368,400) and in jobs financed by public funding, in government agencies, public service, and research and development (9,400). It must be noted that these figures refer to gross employment: to obtain the net employment figures one would need a more complex estimation, taking into account the substitution effects, the budget effects and the impact of imports and exports. Source: Philip Ulrich and Ulrike Lehr, "Renewably employed in the German states: Report on the updated estimate of gross employment in the individual states in 2012", Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 12 July 2013.

158 "Erneubare Energien in Zahlen", Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, July 2013, 30.

159 Ibid., 29.

including exports, was EUR 22 billion.[160] It has served as a driver for innovation and added a new export industry to Germany's portfolio.

As for other European countries, a European Climate Foundation-commissioned study showed that Germany, Denmark, the UK and Sweden all generated growth and added jobs thanks to decarbonisation policies. In other words, competitiveness and low-carbon transitions can go hand in hand.[161]

5. Renewables are the recipient of massive subsidies, while nuclear power and fossil fuels have to play by market rules.

This perception is incorrect. In fact, renewable energies have received less subvention money than nuclear power and fossil fuels, which have been subsidised for many decades. In Germany between 1970 and 2012, the black coal sector received EUR 177 billion, lignite EUR 65 billion, and nuclear energy EUR 187 billion. During the same period, renewable energies received just EUR 54 billion in supports.[162]

At the EU level, the results are similar. A leaked study of the European Commission found that while renewables in Europe received EUR 30 billion in subsidy monies in 2011, nuclear power amassed EUR 35 billion and fossil fuels took home EUR 26 billion.[163] Indirect support for coal and gas amounted to another EUR 40 billion, namely to cover the social and health effects of fossil fuels. These figures do not include the limitation of the liability of nuclear power plant operators in the event of accident, which *de facto* constitutes a subsidy (see point 3 above).

6. The *Energiewende* is an unpopular measure orchestrated from above.

The opposite is the truth. In the early 1980s, the Greens were the only political party arguing for a nuclear phase-out and for a transition to renewables. Today's cross-party consensus on these goals is the result of the adaption of other political parties to the popular will, not vice versa. A number of polls conducted show an overwhelming majority of German citizens behind the *Energiewende*, often 85% to 90%, even if those same polls also show Germans increasingly anxious about costs.[164] Germans *are* willing to pay higher prices to support renewables, surveys show, but only so much more.[165]

7. Germany's increasing use of coal is an upshot of the *Energiewende*.

It is true that in the last two years coal-fired power generation has increased in Germany. However, the use of coal remains below the average for the previous decade, both in absolute terms and as a share of the German power generation mix, and the use of all fossil fuels for power generation has not increased in the last years. The table below shows that coal power production in Germany increased by about 25 TWh from 2010 (the last full year before the closure of the seven nuclear power plants) to 2013. In the same period, gas-fired generation decreased by 23 TWh, and also oil-fired power generation decreased slightly. Thus, from 2010 to 2013 the total amount of fossil fuel generation remained pretty stable, but there has been a substantial switch from gas to coal. In the same period, the increase in power generation from renewables balanced out the steep decrease in nuclear generation.

Looking back to previous years, one can see a slight reduction in coal-fired power generation compared with the previous decade.

160 Peter Bickel et al., "Bruttobeschäftigung durch erneuerbare Energien in Deutschland im Jahr 2012", *DLR*, *DWS*, *ZSW*, *DIW* and *Prognos*, 20 March 2013.

161 "Decarbonisation and the Economy", PricewaterhouseCoopers, October 2013.

162 Swantje Küchler and Bettina Meyer, „Was Strom wirklich kostet. Vergleich der staatlichen Förderungen und gesamtgesellschaftlichen Kosten konventioneller und erneuerbarer Energien , Forum Ökologisch-Soziale Marktwirtschaft 2012.

163 Cerstin Gammelin, "Förderung der Energiebranche Oettinger schönt Subventionsbericht", *Süddeutsche Zeitung*, 14 October 2013. The European Commission did not release this study.

164 "Bürger für Ausbau von Solar- und Windenergie", *Handelsblatt*, 18 September 2013. See also the chart in Chapter 1 of this report.

165 "Bürger würden für Energiewende mehr zahlen", *Focus*, 4 January 2012.

The German Power Generation Mix [166]

TWh	2004	2007	2010	2013
Brown Coal	158 (25.6%)	155 (24.2%)	146 (23.0%)	162 (25.6%)
Hard Coal	141 (22.8%)	142 (22.2%)	117 (18.5%)	124 (19.6%)
Gas	63 (10.2%)	78 (12.2%)	89 (14.1%)	67 (10.5%)
Oil	11 (1.7%)	10 (1.6%)	9 (1.4%)	6 (1.0%)
Nuclear	167 (27.1%)	141 (21.9%)	141 (22.2%)	97 (15.4%)
Renewables	57 (9.2%)	88 (13.8%)	105 (16.6%)	152 (23.9%)
Others	21 (3.4%)	27 (4.1%)	26 (4.2%)	25 (4.0%)
Total generation	**618 (100%)**	**641 (100%)**	**633 (100%)**	**634 (100%)**
Net export	7	19	18	33
Total consumption	**610**	**622**	**615**	**596**

Moreover, an increase in the share of coal in the generation mix has been recently observed in several European countries. There are two main reasons for this cross-border trend. First, the massive decrease of coal prices on the global markets: according to an analysis by Bloomberg, one-year-ahead coal prices decreased by 28% from January 2011 to January 2014.[167] The main cause of the coal price slump is the decreased demand for coal in the U.S. as a result of increased shale gas production there. While hard coal is a global market, gas prices in Europe and in North America are largely independent of each other. A second important reason for the upsurge of coal is the collapse of prices in the EU ETS, which gives a competitive advantage to coal.

However, it must be recognised that the increase of renewable energy in Germany and other countries is indirectly contributing to the switch from gas to coal. By reducing the remaining demand for electricity that must be met by fossil or nuclear power plants, solar and wind energy generation contribute to reducing prices on the power exchange (see Chapter 3). Under current market conditions, for many hours of the year this leaves gas power plants out of the market, thus improving the market shares of coal, and specifically of brown coal.

If this trend was to be confirmed in the coming years, and no countermeasures were taken, it would be a problem, because coal, and especially brown coal, causes much more GHG and other emissions than natural gas. In the medium term, a power system with high shares of wind and solar energy requires more flexibility, and coal power plants are among the least flexible ones.

There is no compelling reason why this upsurge of coal production cannot be managed, however. An appropriate price for CO_2 emissions in the EU ETS could correct this trend. If reform of the EU ETS is not politically viable (because of the opposition of Poland and other countries at the EU level, among other reasons), then other measures can be implemented at the national level if the necessary political will is established.

166 Source: AG Energiebilanzen, http://www.ag-energiebilanzen.de/. The figures for 2013 are nearly complete estimates made by the AG Energiebilanzen in December 2013.

167 Rachel Morison, Utilities Shut 12% of Europe Gas Plants, Oxford Study Shows, *Bloomberg*, 17 January 2014.

List of references

Agency for the cooperation of energy regulators (2013). Public consultation on the influence of existing bidding zones on electricity markets.

Ancygier Andrzej and Kacper Szulecki (2013). German-Polish Cooperation in Renewables: Towards Policy Convergence? Dahrendorf Symposium Paper Series.

Baca-Pogorzelska, Karolina (2014). Węgiel brunatny wraca do łask. *Rzeczpospolit*a, 4 April 2013.

Bardsley, Daniel. Little Hope for Struggling Mine (2013). *The Prague Post*, 30 September 2013.

Bauerova, Ladka and Tino Adresen (2012). Windmills Overload East Europe's Grid Risking Blackout: Energy. *Bloomberg*, 26 October 2012.

Bausch, Camilla and Michael Mehling (2014). *Strengthening Renewable Energy Expansion with Feed-In Tariffs: The German Example*. Friedrich Ebert Foundation (in press).

Bayer, Edith (2014). Report on the Polish power system, Version 1.0., Agora Energiewende.

BDEW (2013). BDEW - Energiemonitor 2013: Das Meinungsbild der Bevölkerung.

BDEW (2013). Foliensatz zur Energie-Info: Kraftwerksplanungen und ökonomische Rahmenbedingungen für Kraftwerke in Deutschland.

BDI (2013). BDI fordert konsistente Klima- und Energiepolitik, press release, 2 June 2013.

Bickel, Peter et al. (2013). Bruttobeschäftigung durch erneuerbare Energien in Deutschland im Jahr 2012. *DLR*, *DWS*, *ZSW*, *DIW* and Prognos.

Blesk (2013). Transformace německé energetiky ohrožuje zaměstnanost v průmyslu, 16 December 2013.

Blesk (2011). V Česku zdraží elektřina o 30 %, kvůli Němcům!, 1 June 2011.

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (2013). Erneubare Energien in Zahlen**.**

Bundesministerium für Wirtschaft und Energie (2014). Press release Gabriel und Hendricks: Europäischer Klimaschutz braucht klare Ziele für den Ausbau erneuerbarer Energien. Press release, 15 January 2014.

Bundesverband Erneuerbare Energien (2013). Hintergrundpapier zur EEG-Umlage 2014.

Business New Europe (2013). Poland backpedals on nuclear strategy, 19 June 2013.

Cambridge Programme for Sustainability Leadership (2013). Clean Energy Finance Solutions: Poland.

ČEPS, MAVIR, PSE and SEPS (2012). Position of ČEPS, MAVIR, PSE and SEPS regarding the issue of Bidding Zones Definition.

ČEPS, MAVIR, PSE and SEPS (2013). Unplanned flows in the CEE region.

ČEPS (2013). Performance Overview for January to June 2013.

Český statistický úřad (2013). Ropa, ropné produkty a zemní plyn.

Ciesnowski, Jacek (2013). Coal is still king. *Warsaw Business Journal*, 23 September 2013.

Ćwiek-Karpowicz Jarosław, Aleksandra Gawlikowska-Fyk and Kirsten Westphal (2013). German and Polish Energy Policies: Is Cooperation Possible? PISM Policy Paper no. 49.

Czech Ministry of Industry and Trade (2013). Aktualizace Státní energetické koncepce České republiky.

Czech Ministry of Industry and Trade (2012). Národní akční plán České republiky pro energii z obnovitelných zdrojů.

Dreblow, Eike, Filip Jirouš, et al. (2013). Assessment of Climate Change Policies in the Context of the European Semester. Country Report: Czech Republic. Ecologic Institute and eclareon.

E15 (2012). Většina Čechů podporuje obnovitelné zdroje**.** 12 June 2012.

E15 (2013). Brusel chce posuzovat podporu pro jádro jednotlivě. ČEZ se nevzdává, 11 October 2013.

Euratom Supply Agency (2013). Annual Report 2012.

Euroheat & Power (2013). TOP District Heating and Cooling Indicators – Poland, 2011.

European Commission (2013). Questions and Answers: Projects of Common Interest in energy, 14 October 2013.

European Commission (2010). Europeans and Nuclear Safety. Special Eurobarometer 324.

European Commission (2013). Green Paper: A 2030 Framework for Climate and Energy Policies.

European Commission (2013). Insurance and compensation of damages caused by accidents of nuclear power plants (nuclear liability).

European Commission (2013). State aid: Commission opens in-depth inquiry into support for energy-intensive companies benefitting from a reduced renewables surcharge. (18 December 2013).

European Environment Agency (2013). Greenhouse gas emission trends (CSI 010/CLIM 050).

European Environment Agency (2013). Trends and projections in Europe 2013 – Tracking progress towards Europe's climate and energy targets until 2020.

European Wind Energy Association (2013). Wind in Power: 2012 European Statistics.

Focus (2012). Bürger würden für Energiewende mehr zahlen, 4 January 2012.

Fulton, Mark, Reid Capalino and Josef Auer (2012). The German Feed-in Tariff: Recent Policy Changes. Deutsche Bank Group.

Gammelin, Cerstin (2013). Förderung der Energiebranche Oettinger schönt Subventionsbericht. *Süddeutsche Zeitung*, 14 October 2013.

Główny Urząd Statystyczny - The Central Statistical Office of Poland (2013). Energy from renewable sources in 2012.

Gram w Zielone (2013). Ceny zielonych certyfikatów znowu w dół. Polski system wsparcia dla OZE wymaga reanimacji, 21 June 2013.

Greenpeace International, EREC and GWEC (2013). Energy [R]evolution – a sustainable Poland energy outlook. Greenpeace.

Greenpeace (2013). Poles back renewables and climate action despite Tusk government's total support of coal, Press Release 12 November 2013.

Handelsblatt (2013). Bürger für Ausbau von Solar- und Windenergie, 18 September 2013.

Hnutí Duha (2012). Průzkum: 65 % obyvatel chce energetickou koncepci založenou na úsporách nebo zelené energii.

Hockenos, Paul (2012). Angst or Arithmetic? Why Germans are so Skeptical about Nuclear Energy. Heinrich-Böll -Stiftung.

Hospodářské noviny (2011). Nečas: Strach z jádra je zbytečná hysterie, 16 March 2011.

Ihned.cz (2011). Německo bez jádra zdraží elektřinu v Česku o třetinu, bojí se Nečas, 1 June 2011.

Institute for Renewable Energy (2013). The Development Plan for Microgeneration for Poland based on Renewable Energy Sources until 2020: A Synthesis.

IPSOS (2011). Global citizens reaction to the Fukushima nuclear plant disaster.

IRENA (2012). 30 Years of Policies for Wind Energy: Lessons from 12 Wind Energy Markets – Denmark.

Janik, Mariusz (2013). Po rewolucji płoną lasy. *Dziennik Gazeta Prawna*, 30 March 2013.

Karaczun, Zbigniew (2011). Poland's Nuclear Plans. In *Energy of the Future? Nuclear Energy in Central and Eastern Europe*, eds. Karel Polanecký and Jan Haverkamp (Praha: Heinrich Böll Stiftung, 2011).

Kemfert, Claudia (2013). *Kampf um Strom: Mythen, Macht und Monopole*. Hamburg, Murmann Verlag.

Klima, Grzegorz and Dorota Poznańska (2013). Model optymalnego miksu energetycznego dla Polski do roku 2060. Wersja 2.0. Kancelaria Prezesa Rady Ministrów. Departament Analiz Strategicznych.

Konrad Adenauer Stiftung (2013). The Perception of Germany's 'Energiewende' in Emerging Countries.

Kotev, Ivan (2012). Temelinomics. Candole Partners.

Krawczyk, Joanna (2010). Grid Connection of Wind Farms in Poland – Problems of Practical Implementation. *DEWI Magazin*, no. 37, August 2010.

Küchler, Swantje and Bettina Meyer (2010). Staatliche Förderungen der Atomenergie im Zeitraum 1950-2010. Forum Ökologisch-Soziale Marktwirtschaft.

Lidovky.cz (2012). Obnovitelné zdroje příliš zdražují energie, říká Kuba, 14 June 2012.

Lidovky.cz (2011). Roman: Německo bez jádra přijde i o průmysl., 2 May 2011.

Loreck, Charlotte et al. (2013). Analyse der EEG-Umlage 2014. Ökö-Institut.

Loreck, Charlotte et al. (2013). Impacts of Germany's Nuclear Phase-Out on Electricity Imports and Exports. Öko-Institut.

Maliszewski, Michał (2009). Wem gehören die Medien? Bundeszentrale für Politische Bildung, 10 August 2009.

Mayer, Johannes et al. (2013). Kohleverstromung zu Zeiten niedriger Strompreise. Fraunhofer-ISE.

Mehling, Michael, Camilla Bausch, Lena Donath and Elisabeth Zelljadt (2013). The Role of Law and Institutions in Shaping European Climate Policy. Ecologic Institute.

Küchler, Swantje and Bettina Meyer (2012). Was Strom wirklich kostet. Vergleich der staatlichen Förderungen und gesamtgesellschaftlichen Kosten konventioneller und erneuerbarer Energien. Forum Ökologisch-Soziale Marktwirtschaft.

Ministry of Economy of Poland (2014). Program polskiej energetyki jądrowej.

Ministry of Economy of Poland (2009). Energy Policy of Poland until 2030.

Ministry of Economy of Poland (2011). Prognosis on fuel and energy demand until 2030.

Morison, Rachel (2014). Utilities Shut 12% of Europe Gas Plants, Oxford Study Shows. *Bloomberg*, 17 January 2014.

Morris, Craig and Martin Pehnt (2012). *Energy Transition: The German Energiewende*. Heinrich Böll Stiftung.

Mostýn, Alexandra (2013). Tschechien macht die Grenzen dicht. *LandesZeitung*, 5 June 2013.

Mszyca, Bartosz (2012). W jaki sposób Europa może skorzystać z niemieckiej rewolucji energetycznej. *Rzeczpospolita*, 25 October 2012.

Najwyższa Izba Kontroli (2009). Informacja o wynikach kontroli bezpieczeństwa zaopatrzenia Polski w węgiel kamienny (ze złóż krajowych).

OECD Economic Survey (2012). Climate change policies in Poland - minimising abatement costs.

Pankowski, Krzysztof (2013). Polacy o energetyce jądrowej i gazie łupkowym**.** Fundacja Centrum Badania Opinii Społecznej.

Patria (2012). STEM: Podpora jaderné energie mezi Čechy po Fukušimě znovu roste. 20 June 2012.

Pobłocka, Anna (2012). Poland's new RE law to boost PV, but boom and bust fears exist, *PV-Magazine*, August 2012.

Prague Daily Monitor (2013). MfD: Czechs, Europe should revise ineffective green policy, 17 September 2013.

PricewaterhouseCoopers (2013). Decarbonisation and the Economy.

Prusek, Tomasz (2013). Czy zimą 2017 r. zabraknie w Polsce prądu?, *Gazeta Wyborcza*, 7 August 2013.

Prusek, Tomasz (2013). Na rozwód z węglem nas nie stać, *Gazeta Wyborcza*, 19 November 2013.

PSE Operator (2010). Plan rozwoju w zakresie zaspokojenia obecnego i przyszłego zapotrzebowania na energię elektryczną na lata 2010-2025.

Rokita, Jan Maria (2013). Czy wygraliśmy niemieckie wybory? *Dziennik Polski*, 27 September 2013.

Rosenkranz, Gerd (2010). *Myth of Nuclear Power: A Guide*. Heinrich Böll Foundation.

Schneider Mycle and Antony Froggatt (2013). World Nuclear Industry Status Report 2013.

Steinhilber, Simone et al. (2011). Indicators assessing the performance of renewable energy support policies in 27 Member States. D17 report of the EU project RE-Shaping: Shaping an effective and efficient European renewable energy market.

Szambelańczyk, Maciej (2014). Co nowego w kolejnym projekcie ustawy o OZE?, *Rynek Energii Odnawialnej*, 14 January 2014.

The Fleet Sheet N° 5528, Prague, 8 January 2014.

THEMA Consulting Group (2013). Loop Flows: Final Advice.

themenportal.de (2013). Energiewende findet laut Studie auch im Ausland Unterstützung, 21 January 2013.

Trilling, Markus (2013). Polish citizens to help meet country's energy needs. *New Europe*, 6 August 2013.

Ulanowski, Tomask (2013). Pługiem i węglem, *Gazeta Wyborcza*, 21 November 2013.

Ulanowski, Tomasz (2013). Czy słońce i wiatr są mniej polskie niż węgiel?, *Gazeta Wyborcza*, 19 November 2013.

Ulrich, Philip and Ulrike Lehr (2013). Renewably employed in the German states: Report on the updated estimate of gross employment in the individual states in 2012. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

UNEP (2003). Energy subsidies: Lessons Learned in Assessing their Impact and Designing Policy Reforms.

Urząd Regulacji Energetyki (Polish Energy Regulatory Office) (2013). National Report: The President of the Energy Regulatory Office in Poland.

Valsecchi Carolina et al. (2007). Reforming Environmentally Harmful Subsidies. Final report to the European Commission.

Vukov, Georgi (2013). Temelinomics 2. Candole Partners.

Wachnicki, Michał (2013). Niemcy Merkel planują jak III Rzesza, *Newsweek.pl*, 18 September 2013.

Wasilewski, Patryk (2013). Poland to Fight Brussels on More Ambitious CO_2 Targets. *Wall Street Journal*, 26 September 2013.

Wilczyński, Michał (2013). Zmierzch węgla kamiennego w Polsce. Institute for Sustainable Development (2013).

Wiśniewski Grzegorz, Katarzyna Michałowska-Knap and Grzegorz Kunikowski (2013). Ocena skutków ekonomicznych utrzymania wsparcia dla technologii współspalania węgla z biomasą. IEO – Institute for Renewable Energy.

Wnp.pl. (2013). KE pozywa Polskę do Trybunału UE za dyrektywę o OZE. 21 March 2013.

World Energy Council (2013). Deutsche Energiewende eine Blaupause für die Welt?

World Nuclear Association (2009). Emerging Nuclear Energy Countries.

World Nuclear Association (2014), Nuclear Power in Poland, as updated in February 2014.

List of abbreviations

ACER	Agency for the Cooperation of Energy Regulators
BDEW	German Association of Energy and Water Industries
CDU	Christian Democratic Union (Germany)
ČEZ	České Energetické Závody
CCS	carbon capture and storage
CZ	Czech Republic
DE	Federal Republic of Germany
EEG	German Renewable Energy Act
EFTA	European Free Trade Association
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSO-G	European Network of Transmission System Operators for Gas
EU ETS	European Union Emissions Trading Scheme
kWh	kilowatt hour
FDP	Free Democratic Party (Germany)
GHG	Greenhouse Gases
IEM	Internal Energy (or Electricity) Market
MEP	Member of the European Parliament
MWh	megawatt hour
PGE	Polska Grupa Energetyczna
PL	Republic of Poland
PV	photovoltaic
RES	renewable energy sources
SPD	Social Democratic Party (Germany)
TWh	terawatt hour
TSO	Transmission system operator
V4-TSOs	TSOs of the Visegrad countries (Czech Republic, Hungary, Poland, Slovakia)

Germany's energy transition, or *Energiewende*, has been a success story thus far in terms of renewable electricity production, technological innovation, job creation, and citizen involvement in clean-energy generation, among other areas. Yet there is room for improvement.

One weakness of the current layout of the *Energiewende* is that, for the most part, it focuses on the national level alone. The impacts of this transition on neighbouring countries have hardly been addressed in Germany. Conversely, some of Germany's European neighbours have called its nuclear phase-out into question. This is especially the case for Poland and the Czech Republic.

In 2013, the Heinrich Böll Foundation, in cooperation with Ecologic Institute, invited experts from the Czech Republic, Germany and Poland to discuss the prospects for better cross-border cooperation arising from Germany's energy transition. This report is the result of the trilateral expert group's discussions. It outlines key observations made by the experts, and helps to identify key questions requiring further investigation. Even though the energy policy approaches of the Czech Republic, Germany and Poland differ, one must keep in mind that all three countries face the challenge of reducing their dependency on coal. The Czech Republic, Germany and Poland are the heartlands of coal in Europe: with just 26% of the entire EU population, these three countries produce 79% of the hard coal, 68% of the lignite (brown coal), and 55% of the electricity generated from coal in the EU.

By addressing information gaps and core issues – such as electricity markets, loop flows and renewable energy support schemes – the report is an impulse for a deeper debate in future. It endeavours to inspire new ideas and provide direction for those who want to further the renewable and energy efficiency agenda in their respective countries and across borders.

Heinrich-Böll-Stiftung, Berlin – Schumannstr. 8, Berlin, 10117, Germany
T +49 285 34-0 E info@boell.de W www.boell.de

Heinrich-Böll-Stiftung, Prague – Opatovická 28, Praha 1, 110 000, Czech Republic
T +420 251 814 173 E info@cz.boell.org W www.cz.boell.org

Heinrich-Böll-Stiftung, Warsaw – ul. Żurawia 45, IIIp., Warszawa, 00-680, Poland
T +48 22 44 01 333 E pl-info@pl.boell.org W www.pl.boell.org