

8. Germany: Promoting an Energiewende Domestically and Globally



Sybille Roehrkasten¹ and Karoline Steinbacher²

The German Energiewende – literally translated as “energy turnaround” – is an outstanding example of a national effort to transform an energy system. Driven by public opposition to nuclear energy, and by efforts to combat climate change, the Energiewende builds on a massive expansion of renewable energy as well as improvements in energy efficiency. So far, efforts have focused on the electricity sector, while progress in the heating and transport sector has been very limited. In addition, Germany also has a long track record of promoting sustainable energy with its international energy policies.

The Energiewende: A maturing energy transition

The Energiewende is a project to transform the German energy sector, driven by efforts to phase out nuclear energy and to protect the climate while safeguarding economic competitiveness and a secure energy supply. Chancellor Angela Merkel’s decision to re-accelerate the phase-out of nuclear energy following the Fukushima nuclear accident in 2011 has brought the term “Energiewende” to the attention of an international audience. However, the Energiewende has a longer history. It is rooted in long-standing public opposition to nuclear energy in Germany, which was reinforced by the Chernobyl nuclear accident of 1986 and led to the vision of an energy system “without petroleum and uranium” (Krause et al., 1981) advocated by renewable energy pioneers. It was the government coalition of the Social Democrats and the Greens (1998–2002) which took the decision to enact policy with a view to fundamentally transform Germany’s energy system. Due to renewed strong public opposition to nuclear energy after Fukushima, the phasing out of nuclear energy is now borne by a cross-

party consensus (Roehrkasten & Westphal, 2012). Nuclear energy, which will be completely phased out by 2022, provided 30 percent of Germany’s electricity supply at the beginning of the 2000s, but this share has already been halved amidst the growth of renewable energy sources (AGEB, 2016). The Energiewende is also taking place against the background of Germany’s ambitious climate protection goals: greenhouse gas emissions shall be reduced by 40 percent by 2020 and by 80–90 percent by 2050, compared to 1990 levels (BMW, 2012). As almost 85 percent of current greenhouse gas emissions derive from the energy sector (BMW, 2015), this sector is the primary target of mitigation efforts in Germany. The Energiewende and its overarching goals are strongly backed by society. Public opinion polls consistently report approval ratings exceeding 90 percent (PwC, 2015; AEE, 2016). This overwhelming public support is also a result of strong citizen involvement in the energy transition, with pioneering activities of towns and villages since the 1990s and almost 50 percent of renewable energy capacity being owned by private citizens and farmers (AEE, 2014).

¹ Leader of the Energy Transition Project (designated), Institute for Advanced Sustainability Studies (IASS).

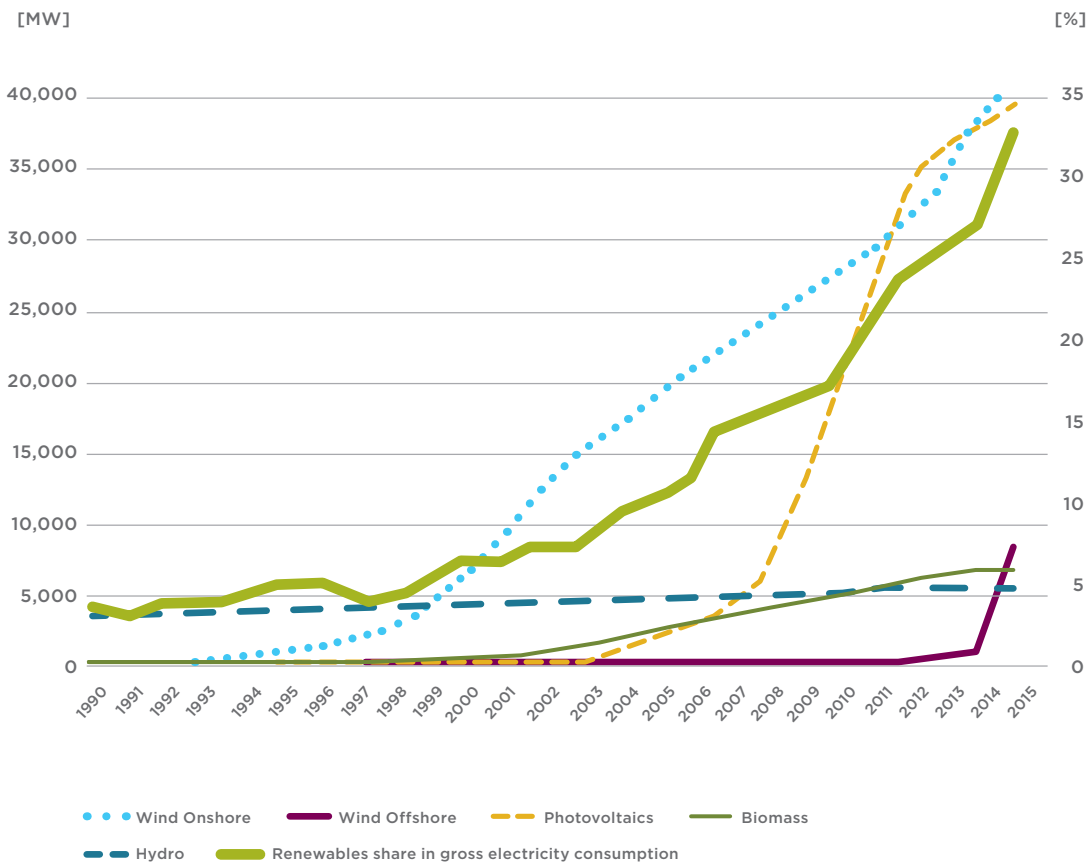
² Associate, Belfer Center for Science and International Affairs, Harvard Kennedy School.

Renewables and energy efficiency as the two pillars of the Energiewende

The cornerstone and most visible success of the Energiewende so far is the expansion of renewables in the electricity sector. Electricity generation from renewable sources increased more than five-fold since 2000. With 195.9 billion KWh, renewables accounted for 32.6 percent of gross electricity consumption in 2015. The government has ambitious plans for future expansion: the share of renewables in the electricity mix is set to increase to at least 50 percent by 2030

and at least 80 percent by 2050. So far, the major renewable source for electricity generation has been wind energy (88 billion KWh, 14.7% of gross electricity consumption), followed by bioenergy (49.4 billion KWh, 8.3%) and solar PV (38.4 billion KWh, 6.4%) (BMWi, 2015; BMWi, 2016a). Although integrating the increasing share of energy that is derived from fluctuating generation sources inevitably requires adjustments to infrastructure and grid management, the supply quality of electricity in Germany has improved further over the years (BNetzA, 2015).

Figure 1: Installed renewable electricity capacity (in MW) and renewables share in gross electricity consumption (in %), Germany, 1990–2015



Source: Steinbacher (2016) based on BMWi 2016b.

A second pillar of the *Energiewende* is the reduction of primary energy consumption. Targets foresee a reduction of 20 percent by 2020 and 50 percent by 2050, compared to the levels in 2008. Here, the heating sector is the primary field of action: The target is to reduce the primary energy demand of buildings by 80 percent by 2020. Germany has managed to decouple economic growth and energy use, but the current mosaic of energy efficiency policies has also been judged too complex and generally insufficient to achieve the country's ambitious targets. The Monitoring Report of the German energy transition shows that greater efforts are required to get on track for achieving the energy efficiency goals (BMW, 2015).

Reforming renewable energy policies

As renewables move from the periphery to becoming a pillar of electricity supply, the government is transforming its support mechanisms for renewables. Feed-in tariffs were adopted with the emblematic renewable energy act "EEG" (Erneuerbare-Energien-Gesetz) in 2000, on the basis of principles introduced with the 1990 Electricity Feed-in Law (Stromeinspeisungsgesetz, StrEG). These provided the basis for the exponential growth of renewable energies so far. Under these feed-in tariffs, producers of renewable electricity are guaranteed fixed, government-set levels of compensation for each kilowatt-hour of electricity produced over a period of 20 years, depending on the technology, size and site of their project. The EEG levy (i.e., the difference between the tariff and the market price) is paid by consumers. The EEG served as a policy model for governments around the world, and contributed significantly to global technological developments and associated cost digression of wind power and solar PV by advancing market creation (Quitow et al., 2016).

In order to control the pace of renewable energy expansion and to enhance competition among renewable energy producers, several fundamental adjustments were made to the initial support framework for renewables. A 2012 reform to the EEG introduced compulsory direct marketing for larger plants; the subsequent 2014 reform, 'EEG 2.0', led to pilot auc-

tions to determine the market premium for ground-mounted solar PV for the period 2015–2016. By 2017, auctions shall be used as a pricing mechanism for all forms of renewable energy. Another element of reform introduced in 2014 is a 'target corridor' for the increase in renewable energy capacity, diverging from the former approach of unlimited renewable energy expansion.

Coal phase-out and transforming the heating and transport sector as major challenges

A critical challenge for the electricity sector in the coming years will be the phase-out of coal-based electricity to meet the country's climate targets. Lignite and hard coal account for a persistently high share of final electricity consumption (44% in 2015, 273 billion kWh).³ In 2016, Germany introduced new payment mechanisms for capacity reserves, consisting of standby coal-fired power plants. The UN climate change envoy strongly criticised this step as providing subsidies for the coal industry (Vaughan, 2016). The coal phase-out is highly controversial in Germany, as coal-producing regions of the country fear job losses and economic downturn. The government has not yet taken the necessary steps to approach this politically sensitive issue in a consistent manner.

Next to the coal phase-out, advancing an energy transition in the transport and heating sectors is urgently needed for effective climate protection. In 2015, renewables accounted for only 13.2 percent and 5.3 percent in the heating and transport sectors respectively. As a result, the renewables share of total final energy consumption remains relatively low, at 13.5 percent in 2015, which also means that 86.5 percent is still provided by conventional energy. While the government aims to increase the share of renewables to 60 percent by 2050, no explicit long-term targets for the transport and heating sectors are in place. Moreover, in the transport sector, Germany is very likely to miss its energy efficiency target. While this foresees a 10 percent reduction by 2020 (compared to 2005), final energy consumption in the transport sector actually increased by 1.7 percent to 2014 (BMW, 2016a).

³ Own calculation based on (BMW, 2016c). The absolute amount of coal-fired electricity has not been reduced significantly since the 1990s. See BMW 2016: *Energiedaten: Gesamtausgabe* (Stand Mai 2016).

International sustainable energy leadership

Germany's Energiewende has received much international attention: Germany is not only an early adopter of renewables that is now fundamentally transforming its electricity supply system; it is also a large, industrialised country that is globally renowned as a "green power" with a high level of technological expertise (Quitow et al., 2016). From the beginning, ambitions to transform Germany's energy supply and international outreach have been deeply intertwined, and German decision-makers have repeatedly underlined the country's international sustainable energy leadership (Roehrkasten, 2015; Steinbacher, 2016; Steinbacher & Pahle, 2016).

Promoting renewable energies and energy efficiency is a key priority of Germany's international energy policy (BMW, 2016d; Auswärtiges Amt, 2016; BMZ, 2016). In line with the goals of the German energy transition, the international activities of the German Government aim to reduce conventional energy use.⁴ The aim is for renewables to gradually replace conventional energy sources or offer an alternative for future capacity additions, and for energy efficiency to curb overall energy demand. Similarly to the domestic case, Germany strongly links its international energy policies with climate protection. The agenda is less obvious with regard to the phase-out of nuclear power in other countries. Phasing out nuclear power is a cornerstone of the Energiewende at home, but the German Government has long been hesitant to explicitly address nuclear energy at the international level. Activities concentrate on rendering alternatives to nuclear energy – renewables and improved efficiency, which are more accessible, attractive and implementable rather than directly challenging the use of nuclear energy (Roehrkasten, 2015).

In line with the current focus of the domestic energy transition, the electricity sector also receives most attention in relation to Germany's international activities. An important aim of Germany's international activities is to strengthen institutions for renewables – nationally, regionally as well as internationally – and to help partner countries create favour-

able regulatory frameworks for renewable energy and energy efficiency as well as the necessary capacities to implement those frameworks. For a long time within the field of renewable energy promotion, much effort was given to promoting feed-in tariffs – the cornerstone of Germany's past promotion of renewables; today, policy advice in the sustainable energy field builds on a more extensive toolkit and a broader range of country experiences.

Germany has a strong track record of supporting sustainable energy in bilateral cooperation. During the 1970s, following the oil price shocks, the country already began supporting the deployment of non-exhaustible energy sources within the framework of its development cooperation. In 2014, Germany was the world's largest provider of official development assistance (ODA) in the energy sector (Roehrkasten et al., 2016 based on OECD data). German development cooperation supports sustainable energy in more than 50 countries, in 24 of which it is a focus area for cooperation (BMZ, 2014). Energy sector ODA has been expanded significantly with the acceleration of the Energiewende in Germany, seeing more than a ten-fold increase since 2000, amounting to more than EUR two billion in 2013 (Steinbacher, 2016). As a commitment to the UN initiative, Sustainable Energy for All (SE4All), energy sector ODA is planned to increase further to EUR 3.6 billion annually by 2030 (BMZ, 2014). Next to renewable energy and energy efficiency, Germany's international development framework aims to expand global access to energy. A particular feature of Germany's development cooperation is the extensive presence abroad of the implementing agencies GIZ (in charge of technical cooperation) and KfW Development Bank (in charge of financial cooperation). The direct placement of GIZ staff in partner countries' institutions over extended periods of time ensures access to nodal points of energy policymaking in the countries. In addition to cooperation within the framework of international development, the German Government maintains bilateral energy partnerships with 12 countries that it considers strategically important.⁵ These partnerships comprise regular high-level government consultations and serve as an umbrella for the various ongoing bilateral cooperation activities. While energy ODA is not directly linked to

⁴ See also BMW (2016e).

the export interests of German industry, the bilateral energy partnerships explicitly aim to improve the business environment for German companies in markets around the world (BMW, 2016d).

In addition to its bilateral activities, Germany has established itself as a driving force for multilateral efforts to promote renewables (Roehrkasten, 2015). Germany's role as the initiator of the International Renewable Energy Agency (IRENA) in 2010 illustrates this ambition particularly well. Germany has strongly influenced the agency's institutional set-up and activities from the beginning. In addition, Germany is the founder and major financier of the multi-stakeholder network Renewable Energy Policy Network for the 21st Century (REN21). Moreover, Germany has used its past two G7/G8 presidencies to promote the decarbonisation of global energy supply. Both the Heiligendamm Declaration (2007) and the Elmau Declaration (2015) contain sections linking development of the global energy sector with climate protection.

In contrast to the foreign energy policies of many other countries, Germany's international Energie-wende policy encompasses a broad variety of actors. The Ministry of Economic Affairs and Energy (BMW) has overall competency for energy policy, both domestically and internationally. It is in charge of the bilateral energy partnerships, Germany's energy strategies vis-à-vis multilateral organisations and networks such as IRENA, REN21, G7 and G20, and initiatives to foster exports of German technologies for renewable energy and energy efficiency. However, the major funder of Germany's international activities to promote sustainable energy is the Ministry for Economic Cooperation and Development (BMZ), while the Ministry for the Environment (BMUB) is responsible for projects that are supported via international climate finance. The Federal Foreign Office (AA) deals with international communication of the Energie-wende. Besides ministries, the implementing agencies GIZ and KfW, political foundations, NGOs, research institutes and business organisations are central to Germany's international activities to promote sustainable energy. The involvement of a range of different actors brings important advantages, as it facilitates

comprehensive and multifaceted activities. Coordinating the activities of the different players is a major challenge. Nevertheless, due to the strong political consensus around the general direction of German energy policy, the various actors advance similar narratives (Steinbacher, 2016).

Relevant impulses for G20

Germany's domestic sustainable energy policies – the Energie-wende – provide various lessons relevant to discussions in other G20 countries and beyond. In particular, broad societal and political consensus around the long-term goals of the Energie-wende has created a favourable investment environment by providing stable framework conditions. While long-term goals of decarbonisation, nuclear phase-out and reduced energy consumption are no longer disputed, the particular design of steps toward an energy system transformation are issues for debate. Upcoming challenges such as coal phase-out will require long-term policy plans and roadmaps to ensure the country meets not only its renewable electricity goals but also its climate goals. In the power sector, Germany has acquired a wealth of knowledge regarding the deployment and integration of large proportions of fluctuating renewable energy, including decentralised systems, which can be shared with partner countries.

Knowledge sharing, institution building and capacity development are also at the core of Germany's international sustainable energy activities. The long-term secondment of advisors to the core energy policy institutions of partner countries has proven particularly valuable in this regard. Linking sustainable energy with topics of particular interest to developing and emerging countries, such as job creation and vocational training, is a promising avenue for further cooperation and an impulse that Germany's efforts may bring to the G20. In addition to bilateral cooperation, Germany has initiated or contributed to the creation of a range of multilateral sustainable energy fora. The importance of "coalitions of the willing" could be reflected in efforts within the G20.

⁵ Currently, bilateral energy partnerships are signed with Algeria, Brazil, China, India, Mexico, Morocco, Nigeria, Norway, Russia, South Africa, Tunisia and Turkey.

References

- Agentur für erneuerbare Energien (AEE) (2016).** Die Akzeptanz für Erneuerbare Energien im Spiegel von Umfragen in Industriestaaten. *Renews KOMPACT*, 29.
- AEE (2014).** Großteil der Erneuerbaren Energien kommt aus Bürgerhand. *Renews KOMPACT*.
- Arbeitsgemeinschaft Energiebilanzen (AGEB) (2016).** Stromerzeugung nach Energieträgern 1990–2015, available at: <http://www.ag-energiebilanzen.de>.
- Auswärtiges Amt (2016).** Energieaußenpolitik, available at: <http://www.bmwi.de/DE/Themen/Energie/Europaische-und-internationale-Energiepolitik/internationale-energiepolitik.html>.
- Bundesministerium für Wirtschaft und Energie (BMWi) (2016a).** *Erneuerbare Energien in Deutschland. Daten zur Entwicklung im Jahr 2015*. Berlin.
- BMWi (2016b).** *Zeitreihen zur Entwicklung der erneuerbaren Energien in Deutschland 1990–2015*. Berlin.
- BMWi (2016c).** Zahlen und Fakten, available at: <http://www.bmwi.de/DE/Themen/Energie/Strommarkt-der-Zukunft/zahlen-fakten.html>.
- BMWi (2016d).** Internationale Energiepolitik, available at: <http://www.bmwi.de/DE/Themen/Energie/Europaische-und-internationale-Energiepolitik/internationale-energiepolitik.html>.
- BMWi (2016e).** Article by State Secretary Rainer Baake regarding Germany's energy reforms in the weekly newspaper Die Zeit, available at: <http://www.bmwi.de/EN/Press/speeches.did=758734.html>.
- BMWi (2015).** *Die Energie der Zukunft. Vierter Monitoring-Bericht zur Energiewende*. Berlin.
- BMWi (2012).** Strukturierung der Ziele des Energiekonzepts, available at: <https://www.bmwi.de/BMWi/Redaktion/PDF/I/strukturierung-der-ziele-des-energiekonzeptes.property=pdf.bereich=bmwi2012.sprache=de.rwb=true.pdf>.
- Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) (2016).** Entwicklung braucht nachhaltige Energie, available at: <http://www.bmz.de/de/themen/energie/>.
- BMZ (2014).** *Nachhaltige Energie in Deutschland*. Berlin.
- Bundesnetzagentur (BNetzA) (2015).** Übersicht SAIDI-Werte Strom, available at: http://www.bundesnetzagentur.de/cln_1432/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/Versorgungssicherheit/Stromnetze/Versorgungsqualitaet/Versorgungsqualitaet-node.html.
- Krause, F., Bossel, H., Müller-Reißmann, K. (1981).** *Energie-Wende. Wachstum und Wohlstand ohne Erdöl und Uran*.
- PwC (2015).** *Energiewende*. Frankfurt.
- Quitow, R., Roehrkasten, S., Jaenicke, M. (2016).** *The German Energy Transition in International Perspective*. IASS, Potsdam.
- Roehrkasten, S. (2015).** *Global Governance on Renewable Energy*. Springer VS Research, Wiesbaden.
- Roehrkasten, S., Quitow, R., Auktor, G., Westphal, K. (2016).** Advancing an international energy transition policy in North Africa and beyond. – *IASS Policy Brief 4/2016*.
- Roehrkasten, S., Westphal, K. (2012).** Energy security and the transatlantic dimension: a view from Germany. – *Journal of Transatlantic Studies*, 10 (4).
- Steinbacher, K. (2016).** Exporting the Energiewende? German Leadership and Renewable Energy Policy Transfer to Morocco, South Africa, and California. Doctoral thesis, Freie Universität Berlin, 2016.
- Steinbacher, K., Pahle, M. (2016).** Leadership and the Energiewende: German leadership by diffusion. – *Global Environmental Politics*. Available at: http://www.mitpressjournals.org/doi/abs/10.1162/GLEP_a_00377#.WBXl3S2LReM.
- Vaughan, A. (2016).** UN Criticises UK and Germany for Betraying Paris Climate Deal. – *The Guardian*, 18 July 2016, available at: <https://www.theguardian.com/environment/2016/jul/18/un-criticises-uk-and-german-for-betraying-the-spirit-of-the-paris-climate-deal>.