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Agenda

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Energy market reform in Germany: what can we expect?

In recent years, the German government has set ambitious targets for energy efficiency and reductions in greenhouse gas emissions, centred on its renewable energy law (EEG). Dr Michael Kraus, head of Oxera's new Berlin office, argues that the feed-in tariff regime is over-supportive and economically inefficient, and that it has considerably increased costs for electricity customers. He sets out the drivers of German energy market reform and the rationale behind the principal options

Over the last two decades, German energy policy has been driven primarily by the objective of maintaining a sustainable energy supply over the long term, and making Germany a highly energy-efficient and ecological economy. The government has adopted ambitious greenhouse gas reduction targets of 40% below 1990 levels by 2020, and 80–95% by 2050.[1]

Following the Fukushima nuclear accident in 2011, the German government decided to phase out nuclear generation by 2022, starting with the immediate closure of the eight oldest plants. The government's subsequent plan for the energy turnaround (Energiewende) set out numerous quantitative targets including an 80% share of renewables in electricity consumption, and a 25% decline in consumption, by 2050.[2]

The effects of these ambitious targets in moving towards a low-carbon energy sector are being felt in the rest of the economy. First, the costs of the renewable energy law (Erneuerbare-Energien-Gesetz, EEG) at the heart of the policy have risen from €1 billion in 2000 to over €20 billion in 2013. Second, the new capacities and the phasing-out of nuclear are creating imbalances in the existing electricity network systems, requiring their re-design. Lastly, the renewables regime is affecting the wholesale market and is depressing the price of electricity. Wind and solar capacities have moved into medium and base load,[3] pushing modern gas-fired units 'out of merit' and rendering new investment to fill the nuclear capacity gap unattractive. The low residual system load (eg, on Sundays), combined with occasionally moderate wind and solar generation, has led to negative prices in the wholesale market.[4]

All this requires a review of the country's current energy policy and, judging from the major political parties' programmes, reform is to be expected shortly after the general election in September 2013.

This article focuses on the first aspect—the reform of the renewable energy regime—and discusses the drivers of the expected electricity market reform; key areas that are likely to be subject to change; and the rationale behind the principal options.

Renewable energy at the heart of the energy turnaround

Large-scale deployment of renewable energy under the EEG is at the heart of the country's ambitious energy policy.

The EEG is designed as a feed-in tariff (FiT) regime, rather than a quota system with tradeable green certificates. Operators of renewable installations receive a guaranteed above-market tariff for each kilowatt-hour (kWh), over a period of 20 years.[5] Technologies such as offshore wind power are awarded a higher tariff per kWh, while solar (photovoltaic) and onshore wind receive a lower tariff. In addition to this technological differentiation, the operation conditions and locations of particular plant are taken into account. For instance, technical yield-to-generation cost assessments ensure that offshore wind installations operating under less advantageous conditions receive higher tariffs.[6]

The various renewable technologies are not yet mature enough to be economically viable under market conditions. They are expected to benefit from

The views expressed in this article are those of the author.

a technological learning curve that translates into higher efficiencies and a decline in costs over time. That is, in order to reflect the expected reduction in costs over time, installations that are commissioned at a later date receive a comparatively lower tariff.[7] The tariffs are intended to reflect actual costs and to allow for a reasonable return in order to attract sufficient capital for the investment.[8]

The technological progress observed in the markets, notably for photovoltaic installations, has been faster than expected. The tariffs did not keep pace with the rapid worldwide decline in the cost of solar panels in 2011 and 2012, and resulted in excessive support. Numerous ad hoc downward realignments of the tariffs have been necessary, but often soon became outdated again.[9]

The German FiT regime, unlike those in other countries, does not feature a ceiling for total financial support or a cap on the total volumes installed.[10] The excessive financial support under this regime has thus encouraged high growth rates of installed capacity. Three-quarters of the total installed photovoltaic capacity have been created in the last three years alone, when FiTs and generation cost have no longer been aligned (see Figure 1 overleaf).

In addition, the EEG stipulates that network operators have to expand their grid capacity accordingly. Operators of renewable installations have the right to be connected to the transmission and distribution networks grid with priority over conventional generation.

Under the EEG, electricity network operators are required to purchase the renewable electricity fed into their networks, and are obliged to sell this electricity on the electricity exchange EPEX SPOT. The FiT regime thus incurs costs that are equal to the network operators' payments less the revenue raised from their wholesale sales. The total EEG cost is divided by total electricity consumption, which translates into the 'EEG surcharge' (expressed in € cents/kWh), which is borne entirely by electricity customers.

Not all end-users have to pay the surcharge, however. The EEG regime features important exemptions and options for 'privileged' end-consumers. Industrial enterprises and railway operators with high electricity consumption benefit from total or partial exemptions. The marketing and sale of renewable electricity directly to consumers, rather than to network operators, is incentivised by a direct marketing premium, adding to the FiT cost. Suppliers that sell renewable electricity benefit from a green power privilege in the form of a surcharge cap at 2.0 ct/kWh. The renewable installations' own consumption of electricity is also exempt from the surcharge. This means that the ultimate EEG surcharge borne by non-privileged end-users is significantly higher than it would be without these exemptions.

The EEG is a victim of its own success

Since its inception in 2000, the EEG has proven effective in introducing renewable energies, notably photovoltaic, onshore wind and biomass. It now risks becoming a victim of its own success. Figure 1 shows the important overall output growth in GWh for 2000–12, notably for onshore wind, photovoltaic and biomass (top of the chart), and the respective EEG payments in € billion (bottom of the chart).

The EEG surcharge has risen steadily over recent years, amounting to 5.3 ct/kWh for 2013, which represents a year-on-year increase of almost 50%. The surcharge has thus exceeded 'exchange parity' with wholesale electricity prices on the German EEX electricity exchange. Various industry reports predict a further significant rise of the surcharge to 6.5 ct/kWh or more in 2014.[11] The high final electricity prices have become a political concern, and political parties and welfare organisations are critical of the fact that low-income households have to bear much of the burden associated with the energy turnaround (leading to 'electricity poverty').

The main reasons for the high level of the EEG surcharge and the significant increases are:

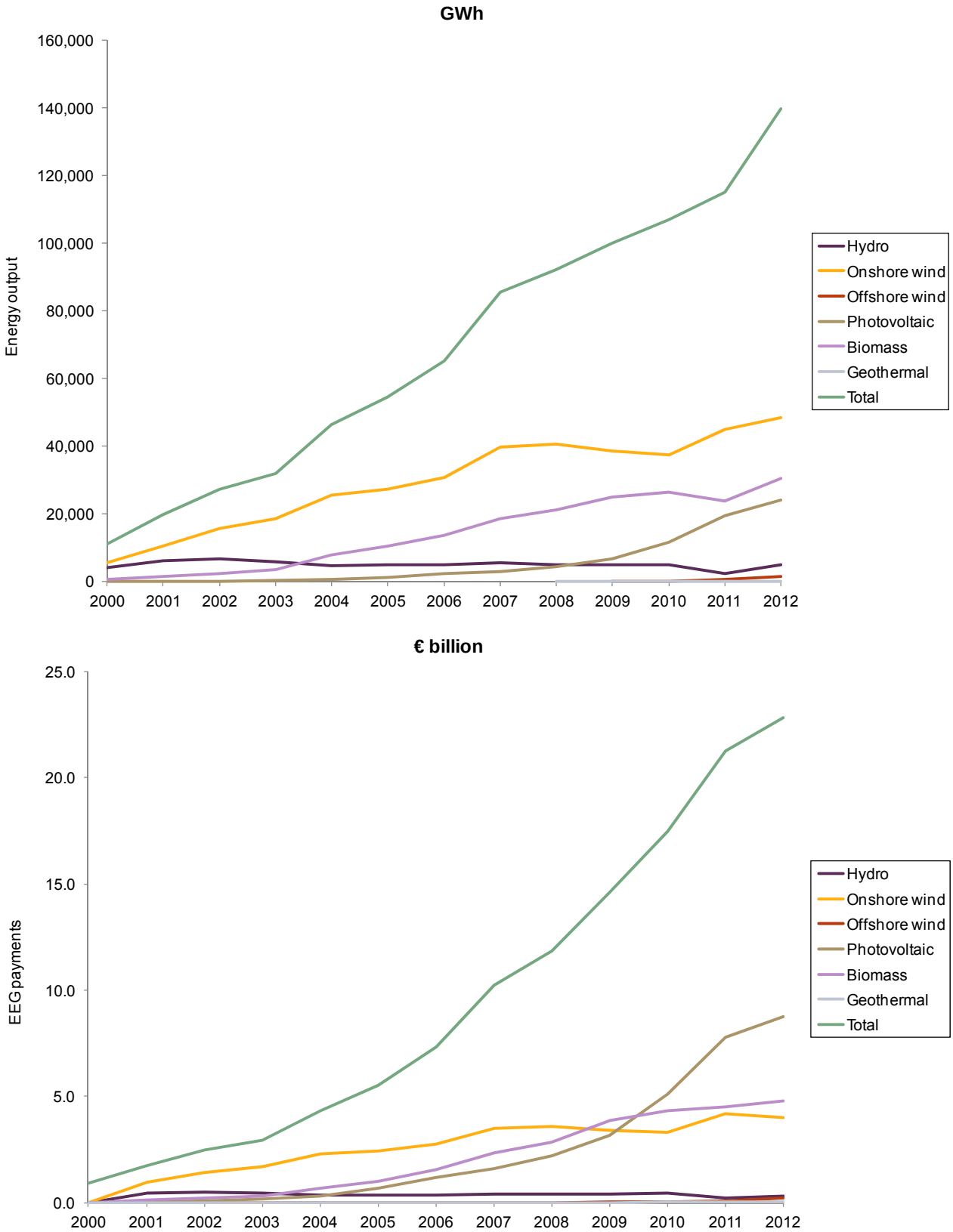
- the growing volumes of renewable installations supported under the EEG;
- the increasing share of renewables with high FiTs, such as photovoltaic and offshore wind;[12]
- the low wholesale prices prevailing in the German electricity market due to reduced residual load and the merit-order effect;
- the rising volumes used by privileged industrial end-users that are exempt from the surcharge.[13]

In addition to the direct EEG cost, the total costs of the energy turnaround will eventually include significant further costs associated with the re-design of the country's electricity networks, the wholesale market and system reserve capacity.[14]

Reform options currently considered

In response to the sharp rise of the EEG 2013 surcharge, the German Economics Minister and Environment Minister agreed that short-term adjustments need to be made to the EEG, and that it should be fundamentally reformed at a later stage, after the 2013 general election.[15]

Figure 1 Renewable electricity generation and EEG payments



Note: A breakdown of the EEG cost is not available for 2000; 2012 values are based on October 2011 estimations.
Source: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, July 2012; Oxera aggregation of biomass data.

The Ministers' short-term initiative was meant to become effective on August 1st 2013. The key measure, known as the electricity price brake (Strompreisbremse), was a freezing of the 2013 EEG surcharge at its current level of 5.3 ct/kWh until the end of 2014, and an annual increase of 2.5% thereafter. In order to finance the curbing, the Ministers planned to suspend the payments for new photovoltaic installations for five months, to permanently reduce the FiT tariff for onshore wind and photovoltaic installations, and to remove the market premium altogether. The initiative was also aimed at existing installations, whose tariffs were to be reduced by 1.5% for one year. The minimum surcharge payment for electricity-intensive industries was supposed to be lifted by a certain percentage, and the exemptions limited to specific sectors.

Ultimately, the initiative did not receive support from the *Länder* (state governments), and the German Chancellor, Angela Merkel, decided to abandon reform efforts before the general election. The state and federal governments, however, ruled out any retrospective measures on existing installations. These proposed measures for existing installations had resulted in much debate about the sustainability of the German regulatory regime and investor confidence, against the background of recent retrospective regulatory interventions in Spain and Norway (Gassled).[16]

In September 2013, the German Monopolies Commission (Monopolkommission), an independent expert committee advising the German government on competition policy and law, presented analysis and recommendations on the state of electricity and gas competition.[17] Not surprisingly, the Commission found that the energy turnaround had squeezed competition because of the high level of support for renewable energies. The most important finding in the report was that the 80% target for renewables could be met most efficiently and reliably by way of a quota model with traceable green certificates. Interestingly, the Commission recommends a Swedish-style quota regime for new capacities, having analysed the recent reforms of the British system.[18] Were the German FiT regime to be maintained, the Commission would recommend further development and incorporation of some of the competitive elements of the British contract for differences (CfD) system, including a volume control.

Under the quota system, the origin of the renewable energy is documented by tradeable certificates. A renewable generator raises revenue through the sale of the electricity plus the sale of the certificates, which can be sold separately. On the demand side, there is a purchase obligation for a particular volume (a quota obligation), which will artificially create the demand for renewable energies irrespective of the technology.

The Monopolies Commission's green certificate recommendation comes with the caveats that it applies only to new renewable capacity, and that, for the time being, the present EEG regime should be maintained and only gradually reformed into a more competitive regime. The Commission emphasises the need to move towards a uniform FiT across all technologies without any differentiation.[19] It says that, while a differentiation would avoid high returns for lower-cost technologies, low-cost potential would remain unused if investors primarily invest in the technologies that yield high returns because of high tariffs—such as solar. An inefficient technology mix would result, whereas a technology-neutral regime would create more competition among renewable technologies.

Trade-offs and outlook

The EEG is at the heart of the ambitious energy policy—and its problems. The regime is over-supportive and lacks allocative efficiency because it is not neutral with regard to technology. Together with uncapped total financial support and the volumes supported, this has increased costs considerably.

The phase-out of nuclear generation is definite and not subject to reversal plans of any kind. The reform options range from tinkering with the present EEG regime to fundamental regime shifts. Numerous issues need to be addressed, although at the same time retrospective changes on existing installations would damage investor confidence. Measures such as the electricity price brake initiative will not solve the EEG regime's structural weaknesses. That initiative reveals the risk that, in the political process, redistribution of the high EEG cost may be intermingled with the curbing of these costs under a more efficient regime. Relieving non-privileged consumers at the expense of renewable generators and hitherto privileged industrial consumers or railway operators will not solve the fundamental problem of inefficiency. Nevertheless, exemptions are likely to persist but be limited to sectors that are subject to international competition. A further alteration of the current system of exemptions may be required by the European Commission, which is reported to be opening a formal EU state aid investigation into the German EEG and its exemptions for electricity-intensive industrial end-users.[20]

Any transition to a green certificate regime for new capacities would require a support scheme that is neutral with regard to technology. This, in turn, would challenge the government's ambitious commitments to offshore wind, which has been identified as the

technology most capable of providing the large-scale additional capacity that the country will need in future.[21]

There is also the prospect of a European convergence of the energy and certificate markets, and the government will need to take this into account in any future regime. A German national quota system will need to be gradually linked with those in other countries in order to create a single market for certificates.

The federal and state governments acknowledge that the introduction of retrospective cuts to renewable subsidies that have already been guaranteed for existing installations would seriously damage investor confidence, and such retrospective actions are therefore not likely.[22] Such legacy commitment reduces the government's scope for an effective reduction of the EEG's currently high gross cost, and the net cost (ie, FiT payments less EEX SPOT revenues) of the existing installations will be significantly reduced only if German wholesale market prices increase. The government would be ill-advised to intervene in the wholesale market for this reason, but could support action at an EU level on a carbon floor price or a withdrawal of permits from the Emissions Trading System, which would have the same effect.

It will be difficult to find a common ground and pragmatic compromises on energy and climate change, and a first-best market design is unlikely to be politically realistic. The reform will also have collateral effects on conventional energies. A foretaste of what is to come is the call by the Association of Renewable Energies (Bundesverband Erneuerbare Energie, BEE) for a level playing field, and the revelation of the true cost of subsidised conventional energies, such as hard coal.[23]

Dr Michael Kraus

[1] Bundesministerium für Wirtschaft und Technologie (BMWi) and Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) (2010), 'Energiekonzept für eine umweltschonende, zuverlässige und bezahlbare Energieversorgung', September 28th, p. 5.
[2] Ibid., p. 5.
[3] The terms base, medium (and peak) load are used in the energy industry to define time periods with different intensities in terms of electricity consumption.
[4] Negative prices mean that the purchaser of the electricity is paid for taking the electricity. Negative prices arise when price-inelastic demand meets price-inelastic supply—ie, 'must-run' nuclear or combined heat and power units or 'generate and forget' renewable units.
[5] For offshore wind operators, the period is 12 years plus a possible extension. Once the initial FiT period expires, a basic tariff of 3.5 ct/kWh is applied until the 20th year of operation (plus the year of start-up).
[6] This is determined by the distance of the installation from the shore, and the water depth. The initial FiT period is extended by half a month for each nautical mile in excess of 12 nautical miles, and by 1.7 months for each full metre below a water depth of 20m. See Gesetz für den Vorrang Erneuerbarer Energien (Erneuerbare-Energien-Gesetz, EEG), article 31, para 2.
[7] The degression rates are based on empirical analysis and determined in consultation with the industry.
[8] The payment is intended to cover the cost plus an adequate return of c. 7%. See Fell, H.-J. (2009), 'Einspeisevergütung für Erneuerbare Energien: Ein wirksames Konjunkturprogramm ohne staatliche Neuverschuldung', April, p. 2.
[9] In the explanatory note to the amendment of the EEG law in 2012, the German government acknowledged that there is excessive support, requiring the reduction of the FiTs. See Deutscher Bundestag (2012), 'Gesetzentwurf der Fraktionen der CDU/CSU und FDP: Entwurf eines Gesetzes zur Änderung des Rechtsrahmens für Strom aus solarer Strahlungsenergie und zu weiteren Änderungen im Recht der erneuerbaren Energien', Drucksache 17/8877, March 6th, p. 1.
[10] A capping mechanism was introduced in 2012 for photovoltaic installations, by which the FiTs for this technology reduce once a total installed capacity of 52GW has been reached. See EEG, article 20b, para 9a.
[11] Bundesverband Erneuerbare Energie (2013), 'Hintergrundpapier zur EEG-Umlage 2014: Bestandteile, Entwicklung und voraussichtliche Höhe', September 3rd.
[12] Three-quarters of total photovoltaic capacity were built between 2010 and 2013—see Figure 1.
[13] In 2012, a total volume of 96 TWh (terawatt-hours) was exempt from the EEG surcharge, or benefited from some form of 'privileged' treatment, which represents 20% of the country's total electricity consumption. See Übertragungsnetzbetreiber (ÜNB) (2012), '50Hertz, Amprion, TenneT, TransnetBW: Prognose der EEG-Umlage 2013 nach AusglMechV – Prognosekonzept und Berechnung der ÜNB', October 15th, p. 10.
[14] These costs will also have to be borne by the final electricity consumers, and comprise costs for the connection of offshore wind parks, financial compensation for delayed offshore connections (ie, grid connections that are not established in a timely manner), expansion and redesign of the transmission and distribution networks, increased balancing power demand, and additional system reserve units.
[15] BMU and BMWi (2013), 'Energiewende sichern – Kosten begrenzen: Gemeinsamer Vorschlag zur Dämpfung der Kosten des Ausbaus der Erneuerbaren Energien', February 13th.
[16] In 2012, the Norwegian government announced plans to cut the tariffs of the regulated offshore gas transport pipeline system, Gassled.
[17] Monopolkommission (2013), 'Energie 2013: Wettbewerb in Zeiten der Energiewende', Sondergutachten 65, Sondergutachten der Monopolkommission gemäß § 62 Abs. 1 EnWG.
[18] The Monopolies Commission held talks about the UK renewable regime with the Department of Energy and Climate Change (DECC) and the Office of Gas and Electricity Markets (Ofgem).

[19] Monopolkommission (2013), op. cit. p. 15.
[20] The status of the investigation has not been officially confirmed by the European Commission. It has been widely reported in the international press that the Commission plans an investigation into Germany's renewable energy law due to concerns that exemptions for some firms from charges levied on power users breach competition rules. See, for example, *Der Spiegel* (2013), 'Verstoß gegen Wettbewerbsrecht: EU greift deutsches Erneuerbare-Energien-Gesetz an', July 14th.
[21] The government's target for installed offshore wind capacity is 10,000 MW by 2010. BMU (2011), 'Hintergrundinformationen zum Ausbau der Erneuerbaren Energien in Deutschland bis 2020', May, p. 1.
[22] Chancellor Merkel confirmed the need for legal protection of existing investments in a press conference after a discussion between the Chancellor and the *Länder* premiers on the energy turnaround, March 21st 2013.
[23] BEE (2013), 'Quotenmodelle sind wettbewerbsfeindlich, teuer und für eine echte Energiewende unbrauchbar', press release, September 5th.