Part C –
The Law of Energy Transition in European Countries: Special Focus on the Law of Renewable Energies

The Law of Renewable Energies in Germany

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A. Empiric development: growing gap between official policies (goals) and reality

In the 1990/2000s, Germany was a pioneer in Europe in promoting renewable energy in the form of (onshore) wind power and rooftop solar installations. The model of a feed-in priority into the electricity grid combined with a fixed, long-term guaranteed feed-in tariff led to an expansion dynamic that significantly exceeded expectations.[1]

From around 2012, however, the voices denouncing allegedly inefficient excessive subsidization gained political momentum. In doing so, they also questioned EU state aid law. However, with regard to the Electricity Feeding Act [*Stromeinspeisungsgesetz*][2], the predecessor of the Renewable Energy Sources Act 2000 [*Erneuerbare-Energien-Gesetz – EEG 2000*[3]], the European Court of Justice (ECJ) had found that the feed-in tariff to be paid by the electricity transmission system operators did not constitute state aid at all (Art. 107(1) TFEU[4]) because this did not involve any direct or indirect transfer of State resources.[5] Much later, the ECJ essentially confirmed

1 For a similar observation see Johannes Saurer/Jonas Monast, 'Renewable Energy Federalism in Germany and the United States' (2021) TEL 293 302 f.; for data on the development over time see Bundeskartellamt, 'Monitoringbericht 2022' *(Monitoring Report)* (2022) 96 <www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Energie-Monitoring-2022.pdf?__blob=publicationFile&v=4> accessed 17 June 2025.

2 BGBl 1990 I 2633, expired by Article 4 of the Act of March 29, 2000 (BGBl 2000 I 305).

3 BGBl 2000 I 305, expired by Article 4 of the Act of July 21, 2004 (BGBl 2004 I 1918).

4 Consolidated version of the Treaty on the Functioning of the European Union [2012] OJ C 326/47.

5 Case C-379/98 *PreussenElektra AG v Schleswag AG* EU:C:2001:160 [2001] ECR I-02099, para 59.

this in 2019[6] for the Renewable Energy Sources Act 2012 [*Erneuerbare-Energien-Gesetz – EEG 2012*[7]].[8]

The practice of transmission system operators to pass on their costs for feed-in tariffs, which were rising steadily with the expansion, down the economic chain to the – mainly private – electricity customers led to concerns about excessively high electricity prices.[9] The expansion of renewable energies in electricity generation thus became a victim of its own success. The unabated momentum towards expansion with the help of the fixed feed-in tariff – which remained in place only for small-scale plants – was succeeded by a cap on expansion by means of fixed tendering quotas for a market premium from 2014 onwards. This model had already been preferred by the Commission in its state aid directives and later on was also enshrined in the then Renewable Energy Directive[10].

For offshore wind power plants, a somewhat different system of interdependence between planning approval and support was introduced in the Offshore Wind Energy Act [*Windenergie-auf-See-Gesetz – WindSeeG*[11]]. In other respects, too, the regulatory framework has become increasingly complicated. This especially applies to the interaction between location planning and plant approval (onshore) or plan approval (offshore) on the one hand and tender competition for the market premium on the other hand. In the meantime, the tendered quantities of renewably electricity generated by Onshore Wind Energy could no longer be fully awarded due to a lack of sufficient bids.[12] The procedure is widely regarded as too

6 Case C-405/16 *Federal Republic of Germany v European Commission* EU:C:2019:268 [2019].

7 BGBl 2008 I 2074, expired by Article 23 of the Act of July 21, 2014 (BGBl 2014 I 1066).

8 This has probably changed at least with the EEG 2023 because now state resources are used in the refinancing system, compare Section C. 2. (b) with (n 52).

9 Bundesministerium für Wirtschaft und Klimaschutz, 'Durchschnittlicher Strompreis für einen Haushalt in Cent/kWh (Jahresverbrauch: 3.500 kWh)' *(Average electricity price for a household in cents/kWh (annual consumption: 3,500 kWh))* <www.bmwk.de/Redaktion/DE/Downloads/I/Infografiken/durchschnittlicher-strompreis-haushalt.pdf?_blob=publicationFile&v=6> accessed 17 June 2025.

10 For the whole development until 2020 also compare Saurer/Monast (n 1) 300–302.

11 BGBl. 2016 I 2258, last amended by Article 44 of the Act of October 23, 2024 (BGBl. 2024 I Number 323).

12 Bundesnetzagentur, 'Ergebnisse der Ausschreibungsrunden für Windenergie-Anlagen an Land' *(Results of the bidding rounds for onshore wind turbines)* <www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Ausschreibungen/Wind_Onshore/BeendeteAusschreibungen/start.html> accessed 17 Junel 2025; Victoria Harsch/Johannes Antoni, 'Alternativen der Förderung erneuerbarer Energien abseits

time-consuming and the risk of ending up without funding and stranded investments may be too great.

Nevertheless, the Renewable Energy Sources Act 2023 [*Erneuerbare-Energien-Gesetz 2023 – EEG 2023*[13]) and the simultaneously amended Offshore Wind Energy Act [*WindSeeG*] have made the expansion targets even more ambitious: The share of electricity generated from renewable energies is to be increased to at least 80 % by 2030 (Sec. 1(1) Renewable Energy Sources Act 2023 – *EEG 2023*). This necessitates a doubling of the proportion of electricity generated from renewable energy sources in overall electricity consumption (with a projected electricity consumption of 780 terawatt-hours[14]).[15] In 2024, its share merely amounted to about 54,4 %.[16] With the completion of the coal phase-out scheduled for 2038 at the latest, the aim is to achieve a carbon-neutral electricity supply in Germany (Sec. 1a(1) Renewable Energy Sources Act 2023 – *EEG 2023*). This goes beyond the European requirements. The following section will take a closer look at the instruments – some of which are new or have been made more concise

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des Ausschreibungsmodells im Lichte des EU-Rechts' *(Alternatives to the tendering model for supporting renewable energies)* (2023) EnWZ 3.

13 BGBl. 2014 I 1066, last amended by Article 1 of the Act of February 21, 2025 (BGBl. 2025 I Number 52).

14 Julian Brandes/Markus Hahn/Charlotte Senkspiel et al., 'Wege zu einem klimaneutralen Energiesystem. Die deutsche Energiewende im Kontext gesellschaftlicher Verhaltensweisen – Update für ein CO_2-Reduktionsziel von 65 % in 2030 und 100 % in 2050' *(Paths to a climate-neutral energy system. The German energy transition in the context of of societal behavior – Update for a CO_2 reduction target of 65 % in 2030 and 100 % in 2050)* (2010) ISE Fraunhofer, 10 <https://www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/Fraunhofer-ISE-Studie-Wege-zu-einem-klimaneutralen-Energiesystem-Update-Zielverschaerfung.pdf> accessed 17 June 2025; a recent Monitoring Report projects lower electricity consumption of 600 to 700 terawatt-hours in 2030, see Energiewirtschaftliches Institut an der Universität zu Köln, 'Energiewende. Effizient. Machen – Monitoring Bericht zum Start der 21. Legislaturperiode' *(Energy. Transition. Efficiency. – Monitoring Report at the start of the 21st legislative term)* (2025) <https://www.bundeswirtschaftsministerium.de/Redaktion/DE/Publikationen/Energie/energiewende-effizient-machen.pdf?__blob=publicationFile&v=20> accessed 23 September 2025.

15 Bundesregierung, 'Ausbau erneuerbarer Energien massiv beschleunigen' *(Rapidly accelerate the expansion of renewable energies)* (2023) <https://www.bundesregierung.de/breg-de/service/archiv-bundesregierung/novelle-eeg-gesetz-2023-2023972> accessed 17 June 2025.

16 Umweltbundesamt, Indikator: 'Anteil Erneuerbare am Bruttostromverbrauch' (Indicator: Share of Renewables in Electricity) (2025) <https://www.umweltbundesamt.de/indikator-anteil-erneuerbare-am#die-wichtigsten-fakten> accessed 17 June 2025.

– that are to be used to regalvanize the trend into a massively dynamic expansion.

B. Current challenges and obstacles for the expansion of renewables

The first challenge is to nearly double the share of renewable energies in electricity generation in just 13 years (until 2038) compared to the previous 25 years or so. At first glance, this seems manageable. However, electricity consumption is projected to increase considerably as a result of so-called sector coupling, i.e. the newly introduced use of electricity in the transport sector too (electromobility), partly in the heating sector (e.g. heat pumps) and finally – possibly after converting to hydrogen – even in industry applications.[17] This represents a major obstacle. Efforts in nature conservation and species protection render finding additional suitable sites on land and at sea increasingly difficult.

The share of renewable energy in the total energy consumption of all sectors merely amounted to about 22,4.% in 2024.[18] The target set by the EU was raised to 42.5 % for 2030 by the amended Renewable Energy Directive (RED III[19]).[20] In Germany, the overall goal is to achieve climate

17 Anna Brinkschmidt, 'Sektorkopplung im Energieregulierungsrecht' *(Sector coupling in energy regulation law*) (Mohr Siebeck 2024) 25.

18 Statista, 'Anteil Erneuerbarer Energien am Bruttoendenergieverbrauch in Deutschland in den Jahren 2005 bis 2024 ' *(Share of Renewable Energies in Germany on Total Energy Consumption in the Years 2005 to 2024.)*<https://de.statista.com/statistik/daten/studie/856326/umfrage/stromerzeugung-aus-erneuerbaren-energien-in-deutschland> accessed 17 June 2025.

19 Directive (EU) 2023/2314 of the European Parliament and the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/65 [2023] OJ L 2023/2413 Art. 1 (2) (a); for the planned implementation in German law, which did not find a parlamentary majority, see Bundesministerium für Wirtschaft und Klimaschutz, 'Entwurf eines Gesetzes zur Umsetzung der Richtlinie (EU) 2023/2413 im Bereich Windenergie an Land und Solarenergie'(*Draft of a bill for the implementation of Directive (EU) 2023/2413 in the area of onshore wind energy and solar energy*) <https://www.bmwk.de/Redaktion/DE/Downloads/Gesetz/20240402-referentenentwurf-umsetzung-red-3-wind-an-land-und-solarenergie.pdf?__blob=publicationFile&v=4> accessed 17 June 2025.

20 For some Background see Alessandro Gemmo, 'European Renewable Energy Directive (RED III): updated ambitious targets to boost the renewable energy market' (2023) <https://sustainablefutures.linklaters.com/post/102ipy5/european-renewable-energy-directive-red-iii-updated-ambitious-targets-to-boost> accessed 17 June 2025;

neutrality by 2045 (Sec. 3(2) Federal Climate Protection Act [*Bundes-Klimaschutzgesetz – KSG*[21]]), that is, five years earlier than on European level (Art. 2(1) European Climate Law [*Europäisches Klimaschutzgesetz*[22]]). The gap between long-term aspirations and today's reality in this overall perspective on the energy transition is thus far greater than in the case of electricity generation. A rapid expansion of the hydrogen market is needed since certain sectors of (heavy) industry can only be decarbonized through the use of green hydrogen.[23]

As the share of volatile renewables in electricity generation continues to grow, securing the stability of the power grid will also become a problem. Prudently, Germany – in contrast to other European countries – terminated nuclear energy in 2023 (cf. Sec. 1 Number 1 Atomic Energy Act [*Atomgesetz – AtG*[24]]). The phase-out of coal-fired power generation, which is particularly detrimental to the climate, must by law be completed by 2038 at the latest, and if possible, by 2035 (see Sec. 2(2) Number 2, 47(1), 56 Coal-fired Power Generation Termination Act – [*Kohleverstromungsbeendigungsgesetz*] [25]). Thus, only natural gas currently remains to counter the volatility of the renewables and to stabilize the grid. As a result of the Russian war of aggression in Ukraine, Germany now heavily depends on LNG

Uta Stäsche, 'Reform des EU-Emissionshandelssystems, der Effort-Sharing-Verordnung, der Erneuerbare-Energien-Richtlinie und der Energieeffizienzrichtlinie – "Fit for 55"?' *(Reform of the EU Emissions Trading Scheme, the Effort Sharing Regulation, the Renewable Energies Directive and the Energy Efficiency Directive – "Fit for 55"?)* (2023) 6 KlimR 171 et seq.

21 BGBl. 2019 I 2513, last amended by Article 1 of the Act of July 15, 2024 (BGBl. 2024 I Number 235); compare also Bundesregierung, 'Intergenerational contract for the climate' (2021) <www.bundesregierung.de/breg-de/schwerpunkte/klimaschutz/climate-change-act-2021-1936846> accessed 17 June 2025.

22 Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2023 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 [2023] OJ L 243/1.

23 Hana Mandová/Tiffany Vass/Araceli Fernandez Pales et al., 'The challenge of reaching zero emissions in heavy industry', (IEA, 2020) <www.iea.org/articles/the-challenge-of-reaching-zero-emissions-in-heavy-industry> accessed 17 June 2025.

24 BGBl. 1985 I 1565, last amended by Article 1 of the Act of December 4, 2022 (BGBl. 2022 I 2153). For an outdated unofficial version Bundesamt für Strahlenschutz, 'Act on the Peaceful Utilisation
of Atomic Energy and the Protection against its Hazards (Atomic Energy Act)' <www.base.bund.de/SharedDocs/Downloads/BASE/EN/hns/a1-english/A1-07-16-AtG.pdf?__blob=publicationFile&v=2> accessed 29 April 2024.

25 BGBl. 2020 I 1818, last amended by Article 7 of the Act of February 21, 2025 (BGBl. 2025 I Number 51).

imports. In the medium term, natural gas will probably lose importance as a bridge technology.[26] Nevertheless, the new German Government is once again increasingly focussing on new gas-fired power plants with up to 20 GW generation capacity to bridge periods without sufficient wind and sun as a so-called power plant reserve [*Kraftwerksreserve*]. Unlike the previous one, the new government will probably even refrain from demanding that these new gas-fired power plants are already prepared for a later conversion to green hydrogen[27]. This harbours the risk of a lock-in effect. Therefore, the massive expansion of renewable alternatives alone is not sufficient to achieve the energy transition: We also badly need the rapid technical development of storage technology and, in the future, hydrogen storage facilities.

C. The legal framework resulting from several amendments

In the German Federal system, most of the relevant law is on the national level. Significant new regulations are contained in the "Act on Immediate Measures for the Accelerated Expansion of Renewable Energies and Further Measures in the Electricity Sector"[28], which amended many relevant specialized laws and came into force in large parts at the beginning of 2023. Further new laws are being added.

1. Preliminary remark on the distribution of competences between the federal government, the states and the municipalities

The central legislative competences for the energy transition are located on federal level (cf. Art. 74 Number 11 and 24 of the German Constitution,

26 Arguing in this direction: Der Informationsdienst des Instituts der deutschen Wirtschaft, 'Natural gas: The bridge is crumbling' (2023) <www.iwd.de/artikel/erdgas-die-bruecke-broeckelt-587736/> accessed 17 June 2025.

27 In favor of "technological openness" [*Technologieoffenheit*] CDU/CSU/SPD, 'Verantwortung für Deutschland – Koalitionsvertrag für die 21. Legislaturperiode' *(Responsibility for Germany – Coalition Agreement for the 21st legislative period)* (2025), para 1067–1072 <https://www.koalitionsvertrag2025.de/> accessed 17 June 2025.

28 Gesetz zu Sofortmaßnahmen für einen beschleunigten Ausbau der erneuerbaren Energien und weiteren Maßnahmen im Stromsektor, BGBl. 2022 I 1237.

the "Basic Law" [*Grundgesetz – GG*[29]]).[30] This also includes the financial support of renewable energies. Except for smaller photovoltaic installations (building permits under the building codes of the Federal States [*Länder*], based on Art. 70 Basic Law [*GG*], the Federation [*Bund*] has legislative power also regarding the approval for generation plants. Most important is the Federal Immission Control Act [*Bundes-Immissionsschutzgesetz – BImSchG*[31]], which regulates, inter alia, the approval of onshore wind energy plants and has been enacted due to Art. 74 Number 24 Basic Law [*GG*]. A difficult mixture of competences exists regarding location planning, especially for onshore wind turbines. Although the federal government is responsible for the legislation on urban land-use planning (Federal Building Code [*Baugesetzbuch – BauGB*[32]]) according to Art. 74 Number 18 Basic Law [*GG*], the state legislatures are responsible at an intermediate level of regional planning and for other supplementary regulations.

In contrast, according to Art. 83 Basic Law [*GG*] the Federal States [*Länder*] are mostly responsible for implementing the relevant federal laws. So concrete location planning for most generating installations (especially onshore wind and solar) is in the hands of the *Länder* and, at the most concrete level, the municipalities. On the basis of Art. 87(3) Basic Law [*GG*], only large-scale planning for electricity transmission grids is largely the responsibility of the Federal Network Agency [*Bundesnetzagentur – BNetzA*[33]], as well as, together with the Federal Maritime and Hydrographic Agency [*Bundesamt für Seeschifffahrt und Hydrograhie – BSH*[34]], planning approval and upstream planning for offshore wind power plants in the German exclusive economic zone.[35] Construction or immission control

29 BGBl. 1949 I 1, last amended by Article 1 of the Act of March 22, 2025 (BGBl. 2025 I Number 94); for an English version see: <www.gesetze-im-internet.de/englisch_gg/> accessed 17 June 2025.

30 For a short overview see Saurer/Monast (n 1) 299–301.

31 BGBl. 2013 I 1274, last amended by Article 11 of the Act of February 24, 2025 (BGBl. 2025 I Number 58).

32 BGBl. 2017 I 3634, last amended by Article 1 of the Act of December 20, 2023 (BGBl. 2023 I Number 394); for an outdated unofficial version ‚Federal Building Code' <www.lexadin.nl/wlg/legis/nofr/eur/arch/ger/Federal-Building-Code.pdf> accessed 17 June 2025.

33 Due to Sec. 1 Regulation on the Assignment of Approval Procedures for Interstate and Cross-Border Extra-High Voltage Power Lines to the Federal Network Agency [*PlfZV*].

34 Due to Sec. 66(2) Offshore Wind Energy Act [*WindSeeG*].

35 See also Saurer/Monast (n 1) 316–317.

permits for other generating installations are issued by the Federal States [*Länder*].

These interdependences reflect the complicated German federal system, whereby the legislative competencies are mainly associated with the federal level and the implementation competences are largely within the *Länder*. That is the so-called "administrative federalism" [*Vollzugsföderalismus*].[36] In recent years, it has significantly hampered the expansion of onshore wind energy because federal states such as Bavaria had set extremely large minimum distances from residential development (until recently 10 times the height of the turbine).[37]

2. Instruments for accelerating the decarbonization of power generation and accompanying change in the financing system

Above all, the amendments to the Renewable Energy Sources Act [*EEG 2023*], which came into force at the beginning of 2023, and in parallel also to the Offshore Wind Energy Act [*WindSeeG*] and to the Combined Heat and Power Act [*Kraft-Wärme-Kopplungsgesetz – KWKG 2023*[38]], are intended to lend new momentum to the energy transition. The Wind Energy Area Requirements Act [*Windenergieflächenbedarfsgesetz – WindBG*[39]]) and parallel amendments to the Federal Building Code [*BauGB*] are important for the identification of suitable sites. In the field of solar energy, the so called "Solar Package I" facilitates the expansion of photovoltaic systems (PV-Sys-

36 For this designation see e.g. Georg Hermes, 'Art. 83 para 16' in Horst Dreier (ed), *Grundgesetz Kommentar (Commentary on the Basic Law)* (3rd edn, Mohr Siebeck 2018); compare furthermore Saurer/Monast (n 1) 294; Arthur B. Gunlicks, *The Länder and German Federalism* (Manchester University Press 2003) 388.

37 More details by Saurer, Monast (n 1) 305–306, 314–315. Recently, this possibility has been mitigated, see Section C. 3.

38 BGBl. 2015 I 2498, last amended by Article 9 of the Act of December 20, 2022 (BGBl. 2022 I 2512).

39 BGBl. 2022 I 1353, last amended by Article 6 of the Act of July 26, 2023 (BGBl. 2023 I Number 202).

tems).[40] The amendment of several laws includes[41] increased support for the use of large-scale PV-Systems to expand solar energy in industry. For private individuals, this law makes it easier to use balcony power plants and to supply buildings with PV-Systems. In addition, area-efficient systems such as agricultural photovoltaics and parking photovoltaics are promoted. There might also be a "Solar Package II" in the near future.

(a) Decarbonization of electricity production

For the most part, the decarbonization of electricity generation still needs subsidization. Only the offshore wind power plants have become so profitable, that companies no longer request subsidies, instead paying a small fortune in recent auctions for the privilege to build their installations in certain offshore areas.[42]

For the generation of electricity from other renewables, the financial support through a market premium (in particular Sec. 20, 22–23a Renewable Energy Sources Act 2023 – *EEG 2023*) and for small-scale plants a fixed feed-in tariff (cf. Sec. 21 Renewable Energy Sources Act 2023 – *EEG 2023*) remain in the foreground. However, it is to be examined whether the funding of renewable energies via the market premium will be supplemented by other regulatory approaches in the future, e.g. by so-called "contracts for difference". For this purpose, the draft for new law contained an authorization to issue a regulation for future adjustments to the support system. However, this authorization did not become part of the Renewable Energy Sources Act 2023.

40 Gesetz zur Änderung des Erneuerbare-Energie-Gesetzes und weiterer energiewirtschaftlicher Vorschriften zur Steigerung des Ausbaus photovoltaischer Energieerzeugung' (*Bill amending the Renewable Energy Sources Act and other provisions of energy industry law to increase the expansion of photovoltaic energy generation*)(BGBl. 2024 I Number 151).

41 See Felicitas Strauch/Bettina Hennig/Veronika Widmann, 'Das Solarpaket I – Überblick über Änderungen am EEG und EnWG' (*The Solar Package I – Overview and Changes in the EEG and EnWG*) (2024), ZNER 291.

42 Due to Sec. 16–22 or Sec. 50–55 Offshore Wind Energy Act [*WindSeeG*]; compare furthermore Bundesnetzagentur 'Verfahren der Beschlusskammer 6 zu Windenergieanlagen auf See und Offshore-Anbindungsleitungen' *(Proceedings of Decision Panel 6 on offshore wind turbines and offshore grid connection lines)* <https://www.bundesnetzagentur.de/DE/Beschlusskammern/BK06/BK6_72_Offshore/BK6_offshore.html> accessed 17 June 2025.

In order to achieve the new expansion target for 2030, the expansion paths (in particular Sec. 4–4a Renewable Energy Sources Act 2023 – *EEG 2023*) and tender volumes for the individual technologies (in particular Sec. 28–28g Renewable Energy Sources Act 2023 – *EEG 2023*) were significantly increased, both in the Renewable Energy Sources Act 2023 [EEG 2023] and in parallel in Sec. 1(2) Offshore Wind Energy Act [*WindSeeG*].

The tendering of the subsidized kilowatt hours continues to be carried out mainly separately according to the types of onshore wind power plants, solar plants on roofs and open-air plants, plants with biomass and biomethane plants as well as hydropower. The "Solar Package I" further strengthens differentiation by creating separate sub-segments in the tenders for area-efficient solar installations such as agricultural photovoltaics and parking lot photovoltaics.[43] Technology-neutral tenders remain the major exception due to the very different technical and financial framework conditions (cf. Sec. 28e, 39n Renewable Energy Act 2023 – *EEG 2023*). In addition, further innovative concepts are promoted in an additional tender segment. This relates above all to the reconversion of green hydrogen into electricity (Sec. 28g, 39p Renewable Energy Act 2023 – *EEG 2023*) and plant combinations of renewable energies with local hydrogen-based electricity storage (Sec. 28f, 39o Renewable Energy Act 2023 – *EEG 2023*), in order to stabilize renewable generation and test its storage in hydrogen and reconversion into electricity.[44] "Green" hydrogen is also being considered for the first time at another point in the support system for generated electricity: New biomethane (Sec. 39k(2) Renewable Energy Act 2023 – *EEG 2023*) and new combined heat and power plants (Sec. 6(1) S. 1 Nr. 6 Combined Heat and Power Act 2023 – *KWKG 2023*) must already be aligned with hydrogen ("H2-ready") as a precaution for a later conversion.

The need for a competitive tendering procedure was reduced to some extent, and fixed feed-in tariffs again granted to a somewhat greater extent, by raising the de minimis thresholds from the previous 750 kW to the

43 With an overview about agricultural photovoltaic Philipp Berg, Licht und Schatten – Vorgaben für Agri-PV-Anlagen und ihre Auswirkungen auf die Vertragsgestaltung *(Light and Shadow – Requirements for Agri-PV Systems and Their Impact on Contract Design)* (2024) EnWZ 55.

44 Bundesregierung, 'Entwurf eines Gesetzes zu Sofortmaßnahmen für einen beschleunigten Ausbau der erneuerbaren Energien und weiteren Maßnahmen im Stromsektor' *(Draft bill on immediate measures for accelerated expansion of renewable energies and further measures in the electricity sector)* (BT-Drs 20/1630, 2022) 4 <https://dserver.bundestag.de/btd/20/016/2001630.pdf> accessed 17 June 2025.

extent of 1 MW permitted by EU law[45] (Sec. 22(2) sentence 2 No. 1, (3) sentence 2 No. 1 Renewable Energy Sources Act 2023 – *EEG 2023*). In addition, wind and solar projects of so-called "Citizen Energy Companies" (*Bürgerenergiegesellschaften*)[46] are exempted from the tendering process, too (Sec. 22(2) sentence 2 No. 3, (3) sentence 2 No. 2, Sec. 22b(1) (2) Renewable Energy Sources Act 2023 – *EEG 2023*) and can thus be realized without bureaucracy. This is intended to strengthen the diversity of players and local acceptance.[47] A new support program for citizen energy was launched to accompany these measures.[48] The structure of the subsidy was adjusted in various places to make the expansion of renewable generation capacity more attractive again, for example by increasing tariffs or suspending previous degressions (cf. Sec. 36b, 39g(5) No. 3, Sec. 49 Renewable Energy Sources Act 2023 – *EEG 2023*).[49]

(b) New refinancing system

The expansion of subsidies costs a lot of money. To prevent a (further) massive increase in electricity prices, the previous refinancing system for market premiums and fixed feed-in tariffs was changed. In the past, the costs were passed down the economic chain from the transmission system operators to the electricity customers and increased the electricity price as the so-called EEG apportionment [*EEG-Umlage*]. Instead, the corresponding expenses of the transmission system operators now lead to a compensation claim against the Federal Republic of Germany (cf. Sec. 58(1) EEG 2023 in conjunction with Sec. 6(1) Energy Financing Act [*Energiefinanzierungs-*

45 European Commission, Communication 'Guidelines on State aid for climate, environmental protection and energy 2022' [2022] OJ C 80/01 para 107(b)(i).

46 This basically means a company which consists of at least 50 natural persons who are resident in an area within a radius of 50 kilometers around the planned installation and in which all voting rights that are not held by natural persons (no more than 25 per cent) are held exclusively by micro, small or medium size enterprises and in which no member or shareholder of the company holds more than 10 per cent of the voting rights (see Sec. 3 no. 15 Renewable Energy Sources Act 2023 – *EEG 2023).*

47 BT-Drs 20/1630, 2022 (n 44) 3, 140.

48 ibid 141.

49 ibid 2, 186, 191, 197–198.

gesetz – EnFG[50]].[51] These claims are compensated by grants from the special fund "Climate and Transformation Fund" of the federal government. Therefore, the restrictions of state aid law (Art. 107–109 AEUV) apply to the present German support regime, because at least now it involves state resources.[52] Revenues from national fuel emissions trading[53] and the (first) European Union Emissions Trading System (EU-ETS I) are used primarily to finance the fund (cf. Sec. 4(1) Climate and Transformations Fund Act [*Klima- und Transformationsfondsgesetz – KTFG*[54]]. In this way, revenues from CO_2 pricing might de facto be partially returned to companies and electricity consumers,[55] but this is not guaranteed. The fund could also be financed from tax revenues (cf. Sec. 4(3) Climate and Transformations Fund Act – *KTFG*), although this is not currently planned[56]. After the new former federal government formed in the winter of 2021, it shifted €60 billion in unused loans originally intended to address the COVID-19 pandemic to the Climate and Transformation Fund.[57] However, the Federal Constitutional Court [*Bundesverfassungsgericht*] has classified this proce-

50 BGBl. 2022 I 1234, 1272 (Number 28), last amended by Article 8 of the Act of February 21, 2025 (BGBl. 2025 I Number 51).

51 With more details Michael Fehling 'Energie' (*energy)* Sec. 6 para. 152 et seq in: Michael Fehling/Jens-Peter Schneider (eds), *Regulierungsrecht* (*regulatory law) (*2nd ed., forthcoming, Mohr Siebeck).

52 According to the European Commission, state aid law was already applicable to the Renewable Energy Source Act 2021 [*EEG 2021*], see European Commission, 'Decision of 29 April 2021' C (2021) 2960 final, State Aid SA.57779 (2020/N) – Germany EEG 2021; also compare Harsch/Antoni (n 12) 6.

53 According to Art. 30 (c) (d) and (k), in 2027 or at least 2028, the new EU-ETS II will replace the national Emission Trading in the Fuel Emission Trading Act (*Brennstoffemissionshandelsgesetz*, BGBl. 2019 I 2728 (Number 50).

54 BGBl. 2010 I 1807 (Number 62), last amended by Article 3 of the Act of December 22, 2023 (BGBl. 2023 I Number 412).

55 Discharging companies and other electricity consumers is in line with Art. 10(3)(ha) of the Consolidated Version of the Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC [2003] OJ L 275/32.

56 Bundesregierung, 'Milliardeninvestitionen in Energiewende, Klimaschutz und Transformation' *(Billions invested in energy transition, climate protection and transformation)* (2023) <www.bundesregierung.de/breg-de/aktuelles/ktf-sondervermoegen-2207614> accessed 17 June 2025.

57 Michael Nienaber, 'Germany boosts its climate fund with 60 bln euro injection' (Reuters 13 December 2021) <www.reuters.com/markets/europe/german-cabinet-passes-climate-fund-booster-with-60-bln-euro-extra-budget-2021-12-13/> accessed 17 June 2025.

dure as unconstitutional.[58] The financing of numerous projects was therefore in jeopardy. However, in 2025, an amendment to the Constitution (Art. 143h GG) established a special fund [*Sondervermögen*] with its own credit authorization for additional investments in infrastructure and for additional investments to achieve climate neutrality by 2045 with a volume up to 500 billion Euro (Sec. 1 Sentence 1). From this money, 100 billion will be transferred into the Climate and Transformation Funds (Sec. 1 Sentence 4).

There are still other apportionments that increase the price of electricity, e.g. the offshore network apportionment and the combined heat and power apportionment. In the Energy Financing Act [*EnFG*], they were standardized and reduced in scope (cf. Sec. 3, 10 et seq. *EnFG*). This is intended to make self-consumption of self-generated electricity from renewable energies and storage projects somewhat more economically attractive.[59]

(c) Complex interaction of subsidizing renewables and emission trading

The new financing system therefore means that the promotion of renewable energies described above is primarily financed with the funds that emitters have to spend on their CO_2 certificates in the EU-ETS I and, in the future, the EU-ETS II. The financial burden laid on fossil fuels by emission trading makes renewable energies relatively cheaper in addition to subsidizing them. Moreover, the revenue from emissions trading will also be used to drive forward the decarbonization of other sectors. In Germany, funding is primarily provided for the energy-efficient refurbishment of buildings. However, funds are also being used to promote rail infrastructure, electromobility, the development of a hydrogen economy and semiconductor manufacturing.[60]

Critics have argued that financial support for renewables does not effectively protect the climate. The reason for this is said to be the EU-ETS I, from which the subsidies are sourced. If emissions are cut early in Germany, more certificates will be available for other emitters. CO_2 emissions

58 Judgment of the German Federal Constitutional Court of November 15, 2023 – 2 BvF 1/22.

59 BT-Drs 20/1630, 2022 (n 44) 142.

60 Bundesregierung (n 56).

would only shift within the EU.[61] This problem can be solved by cancelling the saved certificates.[62] Such a cancellation is possible under Art. 12(4) of the Emission Trading Directive 2003/87/EC.[63] However, the German government has not successfully used this option with regard to the coal-fired power plants that have already been shut down. Previous applications were rejected by the EU-Commission due to formal errors. No more applications were submitted in 2022. The former German government appeared to be relying on the adjustment of the market stability reserve. However, this can only lead to certificates being cancelled to a certain extent. The coal phase-out in Germany will therefore not be able to achieve its full potential for CO_2 reduction.[64]

3. Securing sufficient area for onshore wind energy development

The expansion of onshore wind energy also faltered since individual federal states [*Länder*] did not provide enough land for it. To remedy this shortage, Sec. 3(1) Wind Energy Area Requirements Act [*WindBG*] provides for the distribution of so-called "area contribution values" among the federal states [*Länder*]. Accordingly, by the end of 2027, 1.4 percent and by the end of 2032 2 percent of the territory must be designated for wind power plants. These values are intended to reflect the area requirements resulting from the expansion targets of the Renewable Energy Sources Act 2023 [*EEG 2023*]. The federal states [*Länder*] may continue to decide on minimum distances but must ensure that they achieve their area targets and thus contribute significantly to the expansion of wind energy. If they fail to do so, the state-specific distance rules will cease to apply (Sec. 249(7) Federal Building Code [*BauGB*]*)*. However, valuable time is again at risk of being

61 Charlotte Kreuter-Kirchhof, 'Emissionshandel und Erneuerbare Energien Richtlinie' *(Emissions trading and the Renewable Energies Directive)* (2019) ZUR 396.

62 ibid.

63 Consolidated Version of the Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC [2003] OJ L 275/32; Such a deletion is possible if electricity generation capacities are shut down due to national measures.

64 Hendrik Kafsack, 'Der deutsche Kohleausstieg verpufft' *(The German coal phase-out is fizzling out)* (FAZ 21 October 2023) <www.faz.net/aktuell/wirtschaft/klima-nachhaltigkeit/klimapolitik-der-deutsche-kohleausstieg-verpufft-19257560.html> accessed 17 June 2025.

lost by 2027.[65] According to indications in the coalition agreement, the new federal coalition could even be inclined to weaken the requirements[66].

The examination of bird protection is said to be a major obstacle to onshore wind energy development. In order to accelerate the approval procedures, in 2022 Sec. 45b Federal Nature Conservation Act [*BNatschG*] standardized the assessment of the risk of killing and injuring bird species at risk of collision.[67] All bird species relevant to the assessment are listed in an annex to the Act, which specifies the legal consequences that apply based on the distance of a breeding site of the respective species to a wind turbine. A distinction is made between the "close range", the "central assessment area" and the "extended assessment area". If a breeding site is located outside the extended assessment area, it is irrefutably assumed that the risk of injury is not significantly increased.[68] This standardization should speed up procedures and give project developers legal certainty thanks to its uniformity throughout Germany. However, it is questionable whether this standardization is compatible with EU law. The EU Birds Directive does not limit the scope of the assessment.[69]

Now Sec. 6 Wind Energy Area Requirements Act [*WindBG*] goes even further by stipulating that an environmental impact assessment no longer has to take place in wind energy areas and that the species protection assessment described above no longer has to take place. Similar exceptions apply to offshore wind power (Sec. 72a Offshore Wind Energy Act [*WindSeeG*]). However, this only applies if the project is not located in a Natura 2000 area, a nature reserve or a national park. The competent authority must take measures to ensure the protection of birds on the basis of existing

65 For a similar, but more detailed analysis see Martin Kment, 'Beschleunigung des Ausbaus von Windenergieanlagen an Land' *(Accelerating the expansion of onshore wind energy installations)* (2023) NVwZ 959–963, 965.

66 Compare Coalition Agreement (n 27), para 1034–1038.

67 Oliver Hendrischke, 'Bewältigung naturschutzrechtlicher Konflikte beim Ausbau erneuerbarer Energien' *(Overcoming nature conservation legal conflicts in the expansion of renewable energies)* (2023) NVwZ 965, 969; Mathias Jaenicke, 'Aktuelle Rechtsfragen der baurechtlichen Zulässigkeit von Windenergieanlagen an Land' *(Current legal questions of the requirements in building law for onshore wind energy)* (2023) ZUR 291, 293–296.

68 Ibid 969.

69 For more detailed information see Sabine Schlacke/Helen Wentzien/Dominik Römling, 'Beschleunigung der Energiewende: Ein gesetzgeberischer Paradigmenwechsel durch das Osterpaket?' *(Accelerating the energy transition: A legislative paradigm shift through the Easter package?)* (2022) NVwZ 1581.

data.[70] Neither the developer nor the authority is required to collect new data. If no suitable and proportionate measures are available or if the existing data is more than five years old or insufficiently accurate, the wind turbine can still be approved.[71] The system operator must then pay an annual amount to the federal government, depending on the installed capacity, which is earmarked for species protection programmes.[72] All together, these changes will certainly accelerate the procedures for the approval of wind turbines. However, this will be at the expense of species protection.

In addition, Sec. 2 Renewable Energy Sources Act 2023 [*EEG 2023*] now states that the expansion of renewable energies is considered "overriding public interest". This classification has an impact on the exercise of discretion and substantive legal considerations, for example balancing processes in nature conservation law and species protection law. It also affects ongoing administrative and court proceedings.[73]

A further acceleration for the expansion of onshore wind energy is intended to be achieved through the implementation of the RED III Directive.[74] The legislative proposal of the former Federal Government outlined the establishment of designated "acceleration zones" for onshore wind energy projects. Within these zones, regulatory approval processes were intended for significant streamlining. Anticipated measures encompassed (further) simplifications in the realm of environmental impact assessments, scrutiny related to species protection, and alignment of projects with the

70 Wolfgang Rieger, '§ 6 WindBG – die nächste Runde im Konflikt zwischen dem Ausbau der Windenergie und dem *Artenschutz' (Sec. 6 WindBG – the next round in the conflict between the expansion of wind energy and species protection)* (2023) NVwZ 1042.

71 ibid 1044.

72 ibid 1045 f.

73 For an overview of the effects of the standard in the judiciary to date see: Thomas Lingemann, 'Der neue § 2 EEG in der verwaltungsgerichtlichen Rechtsprechung' *(The new Sec. 2 EEG in the case law of the administrative courts)* (2023) NVwZ 1634; furthermore, compare Frank Sailer/Maria Deuitinger 'Klimaschutz, Gesundheitsschutz und Versorgungssicherheit beim Ausbau erneuerbarer Energien' *(Climate proception, health protection and security of supply in the development of renewable energies)* (2023) ZUR 604, 609–611.

74 Bundesregierung, 'Entwurf eines Gesetzes zur Umsetzung der EU-Erneuerbaren-Richtlinie in den Bereichen Windenergie auf See und Stromnetze und zur Änderung des Bundesbedarfsplangesetzes' *(Draft Bill for the Implementation of the EU Renewable Energy Directive in the Areas of Offshore Wind Energy and Power Grids and for the Amendment of the Federal Requirement Plan Act)* (BT-Drs 20/11226) <https://dserver.bundestag.de/btd/20/112/2011226.pdf> accessed 17 June 2025.

management objectives stipulated by the Water Management Act *(Wasserhaushaltsgesetz – WHG)*. However, this bill no longer found a parliamentary majority after the former coalition broke up. The new Federal Government intends to present a new – perhaps less ambitious – draft bill to implement the RED III Directive[75].

4. Consequences of the expansion of renewable energies for the (grid) infrastructure

Planning and construction of the major new power lines from north to south are progressing quite slowly. Planning and construction times have amounted to more than 15 years. The hopes placed in the multi-stage planning process under the Network Expansion Acceleration Act [*Netzausbaubeschleunigungsgesetz – NABEG*] have not been fulfilled.[76] The delays and cost increases are due in part, but by no means exclusively, to the fact that, under political pressure from Bavaria, there has been a widespread switch from overhead lines to underground cables. The new coalition agreement rightly places particular emphasis on the synchronisation of wind power and grid expansion[77]. There seems to be some hope that the future demand for electricity could perhaps be lower than previously forecast, so that the grid expansion, but also the areas for wind energy, could be reduced a little. In this respect, there are monitoring and evaluation mandates[78]. However, it would be particularly dangerous for the achievement of the climate targets if the failure to push through electromobility and electricity-based heat generation were to result in a lower demand for electricity in the future. Without a massive acceleration of sector coupling (including the production of green hydrogen) with an inevitable significant increase in electricity demand, the renewed failure to meet the sector-specific reduction targets of the Climate Protection Act [*Klimaschutzgesetz*] for transport and buildings would be pre-programmed.

75 Coalition Agreement (n 27), para 971–980

76 For this reason, the legislator recently undertook a comprehensive amendment of the NABEG. Among other changes, the possibilities for exceptions to the comprehensive approval procedure were expanded. Furthermore, the integration of digital processes is anticipated to further expedite the procedural timeline. For more information see Fehling (n 51) Sec. 6 para 185 ff.

77 Coalition Agreement (n 27), para 138 f.

78 Coalition Agreement (n 27), para 983–985, 1034.

The development of hydrogen networks, primarily via the gradual conversion of existing natural gas networks, is still in its infancy. Legislators have already transferred the multi-stage planning regime for natural gas networks to hydrogen networks in 2021. Here, attempts are being made to accelerate the planning procedures through two measures. Firstly, for a hydrogen core network [*Wasserstoffkernnetz*] the Energy Industry Act (*Energiewirtschaftsgesetz – EnWG*)[79] provided for a simplified two-stage planning procedure (Sec. 28q). In the first step, transmission system operators had to submit a joint application for the design of the core network to the Federal Network Agency [*Bundesnetzagentur*] for approval. In a second step, the agency had to check whether the statutory authorisation requirements were met. The authority essentially affirmed this and accordingly granted approval on 22 October 2024 with minor modifications to the layout of the network. Like the other energy grids, the hydrogen core grid is to be financed in principle by grid utilisation fees. However, the state is subsidising its construction through advances, using an amortisation account, and provides a kind of guarantee for any shortfall remaining in this amortisation account (Sec. 28r Energy Industry Act – *EnWG*). This solution has already been authorised by the EU Commission under state aid law. For further hydrogen lines at a later date, the Energy Industry Act *[EnWG]* stipulates that there is an overriding public interest in hydrogen pipelines (Sec. 43l(1) Energy Industry Act – *EnWG*); this has a favourable effect on the balancing of all the interests concerned, which is necessary during the planning approval process.[80] Mere conversions of pipelines from natural gas to hydrogen only require notification (Sec. 113c Energy Industry Act – *EnWG*); this eliminates any time-consuming planning approval procedure. However, should carbon capture and storage (CCS) or even carbon capture and usage (CCU) actually be realised on a larger scale, some of the existing natural gas pipelines would probably also have to be converted into carbon pipelines.

It is problematic that planning for electricity, gas and hydrogen networks essentially takes place separately. Legal scholars are considering upstream integrated system planning, for which only rudimentary approaches can

79 BGBl. 2005 I 1970, 3621, last amended by Article 1 of the Act of February 21, 2025 (BGBl. 2025 I Number 51); unofficial outdated version in English Bundesregierung, 'Energy Industry Act' <https://energyblawg.wordpress.com/enwg/> accessed 17 June 2025.

80 For the effect of this amendment compare Section C. 3. above.

be found so far in Sec. 112b Energy Industry Act [*EnWG*], which were inserted in 2021.[81] Such integrated system planning [*Systementwicklungsplanung*] could not only consider the various transmission grids in their interplay for the energy transition, but also take the generation level into account to some extent and thus serve the implementation of the climate protection CO_2 reduction targets in an overarching manner.[82] However, system development planning only offers an advantage if it lays down binding guidelines in advance. This would guarantee planning security.[83] Otherwise, an additional planning level threatens to further slow down the planning process.

D. Significant problems remaining

The reforms address only individual difficulties; some structural problems remain largely unsolved.

1. High investment risk for preparing participation in the tendering process for a market premium

Especially for wind power plants, there are high hurdles for submitting a bid in the tender competition for a market premium. In particular, onshore plants must already have an immission control permit (Sec. 6 Federal Immission Control Act- *BImSchG*) according to Sec. 36(1) Number 1 Renewable Energy Sources Act 2023 – *EEG 2023*). The financial and time expenditure for this is considerable and acts as a deterrent. It remains to be seen to what extent the situation will be improved by the partial elimination of nature and species protection law.[84]

81 Georg Hermes, 'Die Systementwicklungsplanung – Instrument zur klimagerechten Transformation des Energiesystems' *(System development planning – an instrument for the climate-friendly transformation of the energy system)* (2022) EnWZ 99–103.

82 ibid 99 f.

83 See ibid 101.

84 Describing and classifying the changes: Thorsten Attendorn, 'Umweltrechtliche Ausnahmeabwägungen über die Zulassung von Wasser- und Windkraftanlagen nach dem "Osterpaket"' *(Environmental law exception considerations on the approval of water and wind power plants according to the "Easter Package")* (2022) NVwZ 1586 et seq.

One possibility to shorten the long approval procedures might be a so-called fictitious approval [*Genehmigungsfiktion*]. For example, the Climate Neutrality Foundation has proposed that after a certain period of time, the project is deemed to have been approved if it has not been rejected. The respective deadline depends on the project. In the case of a wind farm for which an environmental impact assessment must be carried out, it might be 22 weeks after receipt of all the necessary documents. For small projects, it might be 10 weeks.[85] The proposal for a deemed approval makes sense in principle but can only be implemented for such small projects. If an environmental impact assessment is required, this must not be undermined by such a fiction. This would not be compatible with the primacy of EU-law. Furthermore, such a fiction would have a negative effect if the agency lacks the necessary staff to deal with the applications in time.

In theory, a similar problem of overly high barriers to participation in the auction[86] might also arise for offshore wind farms, if the auction takes place before the planning process (cf. Sec. 16, 24(1) Number 1 Offshore Wind Energy Act – *WindSeeG*). Such a procedure is used for not preliminary checked areas [*nicht zentral voruntersuchte Flächen*] according to part 2, chapter 2 of this Act. In addition, applicants must already incur expenses for the preparation of an application for planning approval and the documents required for this purpose. Nevertheless, in offshore areas the economic incentives now seem to be high enough to guarantee the participation of a sufficient number of companies.

These problems could not be solved by switching to contracts for difference. Companies would also have to make advance payments in order to participate in a bidding procedure for the amount of the award price. A bidding procedure is necessary because of state aid law which also applies to contracts for difference.[87]

85 Stiftung Klimaneutralität, 'Genehmigungsverfahren beschleunigen mit einem Windenergie-an-Land-Gesetz' *(Accelerate approval procedures with a wind energy on land law)* (2021) <www.stiftung-klima.de/app/uploads/2021/05/2021-05-07-Genehmigungverfahren-beschleunigen-mit-einem-Wind-an-Land-Gesetz.pdf> accessed 17 June 2025.

86 See Section C. 2 (a).

87 See Harsch/Antoni (n 12) 8 (pointing at Communication from the Commission (n 45) para 121).

2. Slow grid extension and modernization

As already stated above, the acceleration of power grid expansion has not succeeded in any way so far. Nevertheless, only minor changes have been made in the relevant law. Most important, all distribution networks below 110 kV are now of "overriding public interest"[88] (Sec. 14d(10) Energy Industry Act- *EnWG*). It remains to be seen whether these changes will be sufficient. Legislators have announced new initiatives to this end and to accelerate the connection of offshore wind turbines, but no one knows what will come of them.

A sufficient supply of "green" hydrogen is also necessary for the transformation of the economy. To this end, the German legislator has decided to amend the Energy Industry Act [*EnWG*] to enable the financing of a hydrogen core network (Sec. 28r Energy Industry Act – *EnWG*).[89] It is to be 9.700 kilometers long and will be financed by the private sector, with the state providing certain guarantees. The core network shall connect the most important entry and exit points in Germany.[90] In contrast to the electricity sector, the construction of a wholly new grid is not necessary here.[91] Around 60 % of the network is to consist of rededicated natural gas pipelines. This will certainly help to speed up the construction. Hopefully, the new 40 % to be built can be constructed sufficiently quickly[92] considering that the investment costs amount to 19.8 billion euros.[93] In order not to burden the first few users of a hydrogen grid with excessively high grid

88 For the effect of this amendment, see Section C. 3. above.

89 For the reasons behind the amendment see Bundesregierung 'Entwurf eines Dritten Gesetzes zur Änderung des Energiewirtschaftsgesetzes' *(German Federal Government (Draft of a third law to amend the Energy Industry Act)* (BT-Drs 20/10014) <https://dserver.bundestag.de/btd/20/100/2010014.pdf> accessed 17 June 2025; also Bundesregierung, 'Wasserstoffnetz für Deutschland – Ausbau und Finanzierung' *(Hydrogen network for Germany – expansion and financing)* (2023) <www.bundesregierung.de/breg-de/aktuelles/energiewirtschaftsgesetz-2240764> accessed 17 June 2025.

90 For all of this see Bundesministerium für Wirtschaft und Klimaschutz, 'Gesetz zur Wasserstoff-Netzplanung und Kernnetz-Finanzierung beschlossen' *(Act on hydrogen network planning and core network financing adopted)* (2023) <www.bmwk.de/Redaktion/DE/Pressemitteilungen/2023/11/20231115-gesetz-zur-wasserstoff-netzplanung-und-kernnetz-finanzierung-beschlossen.html> accessed 17 June 2025.

91 Fehling (n 51) Sec. 6 para 193.

92 For more detailed information on the hydrogen core network see Markus, in this volume, 129 ff.

93 Vereinigung der Fernleitungsnetzbetreiber Gas, 'Hydrogen core network' (*fnb-gas*) <https://fnb-gas.de/wasserstoffnetz-wasserstoff-kernnetz/> accessed 17 June 2025.

usage fees, a so-called 'amortization account' [*Amortisationskonto*] is to be set up, with the help of which the costs are distributed over time. The federal government is to provide a kind of deficiency guarantee in the event that the amortisation account cannot be balanced in 2055.

3. Unsolved storage problems in view of the volatility of wind power and solar energy

Under new legislation, the promotion of electricity storage is addressed only marginally, namely together with power to gas in innovative new tenders. An overarching support concept and location planning are still lacking. In addition, there is probably a need for further efficiency improvements.

Proactive planning is indispensable, in particular since the extent of the required network expansion depends to a large extent on storage capacities available in the future. The legislature at least appears to be aware of this problem and has determined that the construction and operation of electricity storage facilities is in the overriding public interest[94] (Sec. 11c Energy Industry Act – *EnWG*).

4. Insufficient amount of green power and hydrogen in light of increasing demand due to sector coupling

Overall, it must be doubted whether the required amount of electricity from renewable energies will be available in time to attain the necessary expansion and climate targets. As already mentioned, the demand for renewably generated electricity and hydrogen will rise sharply as a result of sector coupling, even if is not clear how high the demand will be due to many forecasting uncertainties.[95] Several key political decisions such as the switch to electromobility or the production of green steel with hydrogen have already been made.[96] The long-term conversion of gas-fired power plants to hydrogen was also planned in order to stabilize the electricity grid in volatile times.[97] The new coalition, however, is much more focussed

94 For the effect of this amendment, see Section C. 3. above.
95 Brinkschmidt (n 17) 25–29.
96 ibid 34, 36.
97 Bundesministerium für Wirtschaft und Klimaschutz (n 90).

on Carbon Capture and Storage (CCS)[98]. The production of renewable electricity and hydrogen must therefore be increased very quickly. The acceleration instruments remain too rudimentary to be successful in meeting the ambitious schedule.

Closing this gap through imports, especially of green hydrogen, is probably only partially possible in the medium term. Negotiations are being conducted with other countries and agreements are being concluded, especially with Canada.[99] However, Germany is competing with many other industrialized countries for import capacities of green hydrogen which even do not yet exist. In addition, the (pipeline) infrastructure required for this is rudimentary at best. New floating LNG-terminals have been planned and built in record time and can theoretically be converted to hydrogen later.[100] However, it remains unclear how long theses terminals are still needed for LNG and when the prerequisites for an economical conversion will actually be in place. Even blue hydrogen, i.e. hydrogen from natural gas whose CO_2 emissions have been captured and stored, is also unlikely to be procured in sufficient quantities in time. Furthermore, the electricity from renewable energies required for CCS could also be used directly for the production of green hydrogen.[101]

Because of European Law, the German System of state funding for the promotion of green electricity also needs some reform. According to Art. 19(1) EU-Electricity Market Regulation [*Strombinnenmarktverordnung*][102], "direct price support schemes for investment in new power generating facilities for the generation of electricity from [renewable] sources […] shall take the form of two-way contracts for difference or equivalent schemes with the same effects". However, it is doubtful whether it makes sense to switch from the tried-and-tested German system (market premium) to contracts for difference. Art. 19(1) of the Regulation leaves a great

98 Coalition Agreement (n 27), para 143–145.

99 Deutsche Welle, 'Germany and Canada sign hydrogen deal' (2022) <www.dw.com/en/germany-and-canada-sign-hydrogen-deal/a-62899992> accessed 17 June 2025.

100 Matia Riemer/Florian Schreiner/Jakob Wachsmuth, 'Conversion of LNG Terminals for Liquid Hydrogen or Ammonia' (2022) ISI Fraunhofer 6 ff. <https://www.isi.fraunhofer.de/content/dam/isi/dokumente/cce/2022/Report_Conversion_of_LNG_Terminals_for_Liquid_Hydrogen_or_Ammonia.pdf> accessed 17 June 2025.

101 See Cäcilia Gätsch, 'Blauer Wasserstoff im Kontext der Energiewende – Aktuelle Entwicklungen und Governance-Fragen' *(Blue hydrogen in the context of the energy transition – current developments and governance issues)* (2023) 10 KlimR 293–294.

102 Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the Internal Market for Electricity (recast).

deal of room for manoeuvre when it comes to the specific design of an "equivalent" future support system. Supplementing the current market premium system with a cap on market revenues would probably also be permissible[103]. In the case of green or low carbon hydrogen, on the other hand, where no tried-and-tested subsidy system yet exists in Germany, such contracts for difference – also known as climate protection contracts [*Klimaschutzverträge*] – are a very serious option. They are already widely used for the direct financial promotion of the use of green or low-carbon hydrogen in industry[104]. Other possible fields of application are the promotion of the construction of electrolysers or even the production of green hydrogen itself.

Last but not least, all funding instruments to accelerate technological progress must be measured against EU state aid law. The USA does not have to take such things into account. With the Inflation Reduction Act, it has launched a very large-scale aid programme to decarbonize the US economy.[105] This might amount to a structural disadvantage of Europe in the competition to attract investments in new "green" technologies.

E. Conclusion

Although there are some useful approaches in the most recent reforms, they get lost in even more confusing detailed regulations. The growing complexity of the European and German legislation might to a certain extent reflect path dependencies,[106] but this development is not inevitable. What is needed is a simplification and restructuring of the relevant law that would promise a significant acceleration of the expansion of renewable energies. At least, the simplification of the species protection assessment appears to be promising, albeit at the expense of environmental protection. Perhaps similar simplifications can also be implemented in other areas of

103 Michael Fehling, 'Finanzierung der Umstellung auf Wasserstoff zwischen Markt und Staat: Förderungsbedarf, Probleme, Rechtsrahmen', in: Akademie der Wissenschaften in Hamburg, Wasserstoff (Financing the Transition to Hydrogen between the Market and the State: Funding Requirements, Problems, Legal Framework, in: Academy of Sciences in Hamburg, Hydrogen), III. 1.3. (forthcoming).

104 For more details see Fehling (n 103), III. 5.2.

105 For a detailed description of the Inflation Reduction Act see Joel B. Eisen, 'Hydrogen Law and Policy Initiatives in the United States' (2024) ZUR 81.

106 Compare Saurer/Monast (n 1) 316–317, however, with a different use of the highly debated theory of path dependency.

the relevant law. As the saying goes: After the reform is before the reform. Time is pressing. We can hardly hope for a timely solution to the problems through technical innovations and market forces alone.

The next step might be a new legal framework for enabling carbon capture and storage (CCS) (and in the future even direct air capture) in Germany. The German government recently published a draft bill for this purpose.[107] Considerable controversy surrounds it´s pros and cons. Even most environmental NGOs now believe that to some extent this technique is unavoidable for the success of the transformation process, but that there are also severe risks for the environment. Furthermore, unreasonable hopes in this not yet mature and extremely expensive technology may postpone the necessary mitigation process. Because there are environmental interests on both sides of the issue, even environmental organizations are divided on this. A similar controversy arose before concerning the acceleration of authorisation procedures for renewable energies at the expense of environmental impact assessments.

After the previous financing model outside of the annual budget for a large number of subsidies has been declared unconstitutional[108], the 500 billion special fund, recently established by a constitutional amendment[109], offers new opportunities for financing investments in renewable energies and combating climate change[110]. A recent monitoring report underlines that the key challenges of the German energy transition lie primarily in the accelerated expansion of renewables, the modernization of grids, the provision of flexibility options, and the efficient use of every additional kilowatt-hour.[111] But at least part of the money can also be used for investments in infrastructure without any reference to climate protection or even contradicting it. It remains to be seen what the new German coalition – according to the coalition agreement with a particular focus on reducing

107 Bundesregierung 'Entwurf eines Gesetzes zur Änderung des Kohlendioxid-Speicherungsgesetz' *(Draft Bill to amend the Carbon Dioxid Storage Act)* BT-Drs. 21/1494 <https://dserver.bundestag.de/btd/21/014/2101494.pdf> accessed 23 September 2025.

108 See (n 58).

109 See above C. 2. (b).

110 For a short overview see Benjamin Wehrmann. Clean Energy Wire, 'Q&A: Germany´s new €500bln fund – What´s in it for Climate and energy?' (2025) <https://www.cleanenergywire.org/factsheets/qa-germanys-eu500-bln-infrastructure-fund-whats-it-climate-and-energy>, accessed 17 June 2025.

111 See Monitoring Report (n 14).

bureaucracy, competitiveness and increasing cost efficiency in climate protection[112] – will make out of it.

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