EUROPEAN COMMISSION

Brussels 21.12.2022
C(2022) 9900 final

PUBLIC VERSION

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Subject: **State Aid SA.102084 (2022/N) – Germany – EEG 2023**

Excellency,

1. PROCEDURE

(1) On 2 December 2022, further to pre-notification contacts, including conference calls and meetings on 28 July 2022, 20 September 2022, 12 and 21 October 2022, 3, 10 and 18 November 2022, and requests for information dated 5 October 2022, 3, 19 and 23 November, to which Germany submitted responses on 31 October 2022, on 7, 9, 18, 21, 25 and 30 November 2022, and on 1 and 12 December 2022, Germany notified a set of amendments (hereinafter, the "notified measures") to its renewable energy scheme ('*Erneuerbare Energien Gesetz'*, hereinafter 'EEG') ([1]), as already amended once ([2]), pursuant to Article 108(3) of the Treaty on the Functioning of the European Union ("TFEU"). A further request for clarifications was sent on 12 December, to which Germany submitted the responses on 14 December.

([1]) Approved by decision of 29.04.2021, C(2021) 2960 final, State Aid SA.57779 (2020/N) Germany EEG 2021 – Reform of the Renewable Energy Law (OJ C 240, 18.06.2021, p. 4-5). Available at: https://ec.europa.eu/competition/state_aid/cases1/202124/288710_2283746_342_2.pdf.

([2]) Decision of 09.12.2021, C(2021) 9329 final, State Aid SA.64376 (2021/N) Germany EEG 2021 amendments (OJ C 46, 28.01.2022, p. 5-6). Available at: SA_64376_E07E447E-0000-CA66-81FD-5938C3224B68_69_1.pdf (europa.eu).

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(2) By letter dated 23 May 2022, Germany agreed to exceptionally waive its rights deriving from Article 342 TFEU in conjunction with Article 3 of Regulation 1/1958 ([3]) and to have the present decision notified and adopted in English.

2. DETAILED DESCRIPTION OF THE MEASURES

(3) The notified measures relate to the support of production of electricity generated from new and modernised renewable installations ([4]).

2.1. National legal basis, background and objectives of the notified measures

(4) The notified measures amend the EEG, approved by Commission decision in case SA.57779, as already amended once (those amendments were approved by Commission decision in case SA.64376), and are intended to apply until 31 December 2026.

(5) These measures are included in Article 2 of the 'Law on emergency measures to accelerate the expansion of renewable energy and other measures in the electricity sector' ('*Gesetz zu Sofortmaßnahmen für einen beschleunigten Ausbau der erneuerbaren Energien und weiteren Maßnahmen im Stromsektor'*). Article 2 of that law amends the EEG 2021, which becomes the 'EEG 2023'. It was adopted on 20 July 2022 and enters into force on 1 January 2023, under the suspensive condition of State aid approval by the Commission.

(6) The notified measures also include the so-called South quota for biomass and biomethane, which were already included in §39d of the EEG 2021, but are still subject to State aid approval.

(7) The notified measures also include amendments to the innovation tenders provided for in §§8, 9 and 11 of the Innovation Tender Ordinance ('*Innovationsausschreibungs-verordnung*' or "*InnAusV*") of 20 January 2020, included in the 2022 Law on emergency measures to accelerate the development of renewable energy and other measures in the electricity sector ('*Gesetz zu Sofortmaßnahmen für einen beschleunigten Ausbau der erneuerbaren Energien und weiteren Maßnahmen im Stromsektor'*), amending several sections of the InnAusV, including §§8, 9 and 11.

(8) On 8 October 2022, in light of the further deepening of the energy crisis due to the Russian war of aggression against Ukraine, Germany also adopted a law amending the Energy Security Act and other energy regulations, which includes measures leading to a further reduction of gas consumption in the winter of 2022-2023 and the winter of 2023-2024 ('*Gesetz zur Änderung des Energiesicherungsgesetzes und anderer energiewirtschaftlicher Vorschriften*'). Articles 7 and 8 of that law include emergency measures which should lead in the short term to an increase in the electricity production from renewable energy sources ('RES'). As a consequence, the law amends the support for ground-based

([3]) Regulation No 1 determining the languages to be used by the European Economic Community (OJ 17, 6.10.1958, p. 385).

([4]) Amendments to the support scheme for offshore wind installations connected to the grid are assessed in the decision in case SA.103069 (2022/N).

solar PV ([5]) and biogas in the EEG 2023 for a limited period of time (*i.e.* until the end of 2023 only) ([6]).

(9) Since the decision in case SA.57779, the Union has set an ambitious climate protection target of reducing greenhouse gas emissions by at least 55% by 2030, with a view to becoming climate neutral by 2050 ([7]). In order to achieve this target, Germany needs to drastically increase the use of RES. The Federal Government of Germany has set itself the new target of generating 80% of electricity consumption from renewably energy sources by 2030, with a view to become climate neutral by 2045, earlier than the Union-wide target.

(10) This translates into the following (increased) annual targets as regards RES electricity production:

Table 1: Targets electricity production from renewable energy sources (TWh)

in TWh	2023	2024	2025	2026	2027	2028	2029	2030
EEG 2021	281	295	308	318	330	350	376	
EEG 2023	287	310	346	388	433	479	533	600

(11) To achieve these targets, the EEG 2023 sets out the following capacity expansion paths for renewable energy from solar, onshore wind and biomass:

Table 2: RES capacity expansion paths (cumulative capacity in GW)

in GW	2024	2026	2028	2030	2035	2040
Onshore wind	69	84	99	115	157	160
Solar	88	128	172	215	309	400
Biomass				8.4		

(12) In order to achieve the increased 2030 targets, Germany has amended the tender volumes for onshore wind, ground-based solar PV, rooftop solar PV, biomass, biomethane and innovation tenders as follows:

Table 3: Tender volumes in the EEG 2023

in MW	2021*	2022*	2023	2024	2025	2026	2027	2028	2029
Onshore wind	4500	5190	12840	10000	10000	10000	10000	10000	NA
Ground based PV	1850	3600	5850	8100	9900	9900	9900	9900	9900
Rooftop PV	300	2300	650	900	1100	1100	1100	1100	1100
Biomass	600	600	600	500	400	300	300	300	NA
Biomethane	150	150	600	600	600	600	600	600	NA
Innovation tenders	500	700	800	850	900	950	1000	1050	NA

** the volumes for 2021 and 2022 are the EEG 2021 tender volumes*

(13) The tender volumes are specified until 2028 or 2029, as installations awarded support under the EEG 2023 up to 2028 or 2029 are realised before and up to

([5]) PV stands for photovoltaic solar energy.

([6]) In the light of the crisis due to the Russian war of aggression against Ukraine, and the need to rapidly introduce alternative forms of energy in the market, to replace natural gas, the biogas measures have started already in October 2022.

([7]) Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), OJ L 243, 9.7.2021, p. 1.

2030 and therefore impact the achievement of the 2030 target. In most of the RES categories, except for rooftop solar PV and biomass, the tender volumes increased with the EEG 2023.

(14) The notified measures concern only support to renewable energy sources. §1a of the EEG 2023 provides that at the latest by 31 March 2024, the German government will carry out an assessment of market driven deployment and make a proposal on the future financing of renewable energy deployment after the completion of the coal phase-out ([8]).

2.2. Beneficiaries

(15) The eligible beneficiaries of the aid are producers of electricity from RES that fulfil the conditions for support under the EEG 2023.

2.3. General principles regarding aid award, form of aid and level of support

2.3.1. Tendered versus non-tendered aid

(16) Onshore wind and solar PV installations (both ground-based and rooftop) with an installed capacity above 1 MW, new biomass and biomethane installations with an installed capacity above 150 kW and all existing biomass installations will be eligible for support, only if they have been selected in tenders. For solar PV and onshore wind installations, Germany increased the threshold to participate in tenders from 750 kW to 1 MW, in line with point 107(b)(i) of the Guidelines on State aid for climate, environmental protection and energy ('CEEAG') ([9]), in force since January 2022.

(17) The following installations and technologies are exempt from participating in tenders:

(a) Solar PV, onshore wind, biomass, biogas and biomethane installations up to the thresholds mentioned in recital (16): the level of funding (feed-in tariffs) or the reference value is set by law ([10]).

(b) Installations producing electricity based on hydropower, geothermal power, landfill gas, and sewage gas: since there are only very few installations and therefore potential bidders, the level of funding continues to be set by law as under the EEG 2021.

(c) Pilot installations, which consist of (i) onshore wind installations showing innovative technical characteristics and requiring individual certification (only the first two prototypes), and (ii) onshore wind installations which

([8]) Germany plans to end energy production from coal by 2038, as described in the Commission decision in case SA.58181.

([9]) OJ C 80, 18.2.2022, p. 1.

([10]) The possibility in the EEG 2021 for rooftop PV installations between 300 and 750 kW to choose between a feed-in premium based on an administratively set reference value or a feed-in premium based on their bid in a tender procedure, has been abandoned in the EEG 2023.

are mainly dedicated to research and development and which are testing a significant innovation going well beyond the state of the art ([11]).

(d) Citizen energy association or renewable energy community projects (‘*Bürgerenergiegesellschaften’*) for onshore wind installations of up to 18 MW and solar energy installations of up to 6 MW.

(18) The EEG 2023 applies to installations entering into operation as of 1 January 2023 (for administratively set remuneration) and to installations receiving a tender award as of 1 January 2023 (for remuneration allocated through tenders).

(19) Support under the EEG 2023 is granted for 20 years, except for existing biomass installations where the support is limited to 10 years.

2.3.2. Form of aid: Feed-in tariff, sliding market premium

(20) As was already the case under the EEG 2021 (see section 2.4.1 of the decision in case SA.57779), as a rule, aid is paid as a market premium that is obtained on top of the market price for the electricity. The premium is paid out by the network operator to whose network the EEG electricity installation is connected.

(21) The premium is a sliding premium, corresponding to the difference between a reference value (‘*der anzulegende Wert’*) and the market price of the electricity. The reference value aims at covering the production costs of the electricity concerned, a reasonable return and a management premium to cover the costs of direct marketing. For installations subject to tendering, the reference value is determined by the tender; for installations not subject to tenders, the reference value is set in the EEG ([12]). The installations are obliged to sell their production on the market for electricity (‘*direct marketing’*), or to partly self-supply (see recital (50)).

(22) However, electricity produced in installations with an installed capacity of up to 100 kW maximum is still entitled to feed-in tariffs, which are fixed by law. When they apply for feed-in tariffs, they transfer their electricity to the network operator to which they are connected and obtain the feed-in tariff. As a consequence, these small installations are not directly participating in the market.

(23) Feed-in tariffs differ for the various energy sources and vary according to the capacity of the installation. As was the case in the EEG 2021, the feed-in tariffs correspond to the reference values, set for the corresponding technologies in the EEG, minus 0.2 ct/kWh (for dispatchable installations ([13])) or minus 0.4 ct/kWh

([11]) According to the German authorities, the second category of installations correspond to the concept of demonstration projects within the meaning of point 19(23) of the CEEAG. Germany also explained that to show the existence of a significant innovation going well beyond the state of the art, it will thus be necessary to demonstrate that the technology is entirely new, *i.e.* that it is the first of its kind in the Union.

([12]) The methodology to determine the market premium based on an administratively set reference value is established in Annex 1 to the EEG 2023.

([13]) Dispatchable energy sources are energy sources that can be ramped up or shut down in a relatively short amount of time according to pre-determined planning instead of depending on a natural resources (such as wind or sun).

for non-dispatchable installations (wind and solar), which cover the marketing costs. Installations benefiting from a feed-in tariff do not incur marketing costs, as the sale of electricity on the market is carried out by the Transmission System Operators ('TSOs').

(24) The EEG 2023 also maintains the fall-back feed-in tariff ('*Ausfallvergütung*') ([14]) and the possibility to sell electricity directly on the market without requesting any support under the EEG (hereby receiving a guarantee of origin for the electricity concerned; '*sonstige Direktvermarktung'*), as described in recitals 28 and 29 of the decision in case SA.57779. Germany has confirmed that only a very small part of installed capacity relies on the fall-back feed-in tariff, and, that for the majority of operators using it, it applies only once a year on average. For instance, in 2022, 250 MW have been (partially) applying the fall-back feed-in tariff, which amounts to 0.3% of the entire installed renewables capacity. Hence, the effects of the fall-back feed-in tariff are negligible, not affecting competition and trade, and therefore not in detail assessed in the current decision.

(25) Furthermore, as under the EEG 2021, certain biomass installations, which receive support for the production of RES electricity, can – under certain conditions – also apply for payments for flexibility. The conditions were amended in the course of 2021 and approved by the decision in case SA.64376 (see section 2.2.4 of that decision regarding the flexibility payment).

(26) The EEG also specifies that no support will be paid for hours in which the spot market price is negative, whenever negative prices persist for at least 4 consecutive hours (§51 EEG). The number of non-remunerated negative price hours will be added at the end of the support period for contracts awarded through tenders. Germany commits to reduce the maximum number of consecutive hours constituting a period of negative electricity prices during which operators of RES installations procured under the EEG 2023 will be eligible to receive remuneration for their production, which will be brought to 0 by 1 January 2027. Germany submits that an immediate reduction to 0 as of 1 January 2023 is not possible for system stability reasons. Instead, Germany will launch a phase-out plan as follows:

(a) As a first step the number will be reduced from currently 4 to 3 consecutive hours as of 1 January 2024 until 31 December 2025.

(b) As a second step, the number will be reduced to 2 consecutive hours as of 1 January 2026 until 31 December 2026.

(c) As a final step, support in times of negative prices for new installations will be completely phased out by 1 January 2027.

(27) This phase-out plan shall apply to all contracts signed under the EEG 2023, i.e. only to contracts procured as from 1 January 2023. Germany may deviate from this phase-out plan, if necessary:

([14]) Electricity operators producing renewable electricity in installations with installed capacity of more than 100 kW can temporarily obtain a feed-in tariff and transfer their electricity to the network operator to which they are connected when they cannot find a buyer for their electricity. The feed-in tariff is limited to 80% of the reference value.

(a) to align with a common European approach to remuneration of renewable generation at times of negative prices, if a detailed harmonized approach is developed in European legislation; or

(b) if an execution of the plan would lead to evidence-based and unavoidable technical risks threatening system stability, which have not been resolved on a European level.

(28) Finally, in order to avoid overcompensation at times of excessively high electricity market prices, as is currently the case as a result of the Russian war of aggression against Ukraine, Germany foresees the following actions in the next years.

(29) For the year 2023, Council Regulation (EU) 2022/1854 of 6 October 2022 on an emergency intervention to address high energy prices ([15]), provides for a binding cap on market revenues for producers of electricity produced from renewable energy sources. This is the Union response to the unforeseen high electricity prices, mainly due to the increasing disruption of gas supplies from Russia. This Regulation aims at avoiding uncoordinated caps on market revenues from the production of electricity in installations with lower marginal costs and related distortions between Union producers. Regulation (EU) 2022/1854 provides, in principle, for a maximum revenue limit of 180 EUR/MWh of electricity generated. Article 8 of the Regulation allows Member States to further limit market revenues, where appropriate differentiated by technology, or, exceptionally, to set a higher limit in cases where the investment and operating costs of installations exceed the limit of 180 EUR/MWh. These rules apply from 1 December 2022 until 30 June 2023, but a review is envisaged by 30 April 2023 following which an extension and/or adjustment of the envisaged cap on market revenues might be proposed.

(30) Germany will implement a cap on market revenues as mandated by Articles 6 to 8 of Regulation (EU) 2022/1854. In its implementation of the Regulation, Germany will implement measures with regard to the fact that there are substantial differences in the cost of electricity generation between different technologies and this for the entire year 2023. If Regulation (EU) 2022/1854 is extended in application of Article 20 of said Regulation, the measures will be extended to match this extended duration. The longest extension date will be 30 April 2024. In addition, Germany will adjust the measures if necessary to align with a common European approach for an adequate remuneration of renewable generation if a detailed harmonized approach is developed in European legislation.

(31) If such a harmonized approach is not applicable by 30 June 2024, Germany commits to limit profitability and/or to implement clawbacks as required by point 90 of the CEEAG for contracts entered into when there is significant uncertainty concerning future market development to ensure proportionality also in this case, for all installations that are awarded a contract in a tender as of 1 July 2024.

([15]) OJ L 261I, 7.10.2022, p. 1.

2.3.3. Determination of the need and level of support through funding gap analysis

(32) Despite the current high electricity market prices, in particular as a result of the Russian war of aggression against Ukraine, Germany argues that this does not change the fact that renewable energy installations still need support in order to be profitable over their entire lifetime of 20 years. The electricity price scenarios known to the German federal authorities do not suggest that the electricity prices will remain high in the long run. As a consequence, Germany argues that the cost of electricity generation from RES is expected to be higher than the market price for electricity over the long run, so that the need for State aid remains.

(33) To establish the need for State support and the level of support in the case of non-tendered aid (establishing the level of feed-in tariffs and the level of the reference value set in the law), Germany has submitted a quantification of all the costs and revenues over the lifetime of the installations, for each of the reference projects per technology. Germany explains that the reference projects have been chosen per RES technology to represent typical installations with the most common and representative average size of installed capacity and with average representative technical configurations of the installations. Since the basic principles on which the funding gap analyses are based, are similar for all technologies, the methodology is explained in this section and applies to all funding gap analyses throughout this decision. The methodology is also the same as the one applied in the decisions in cases SA.102303 ([16]) and SA.103086 ([17]) adopted on 27 September 2022.

(34) The relevant cost parameters are the initial investment cost (capex), which is generally increasing with the size of the installation, and the recurring operating costs, which have been adjusted for inflation (2%) in the analysis. Despite the currently high levels of inflation, Germany opted to take a precautionary approach and consider the 2% inflation target of the European Central Bank in the analysis.

(35) The relevant revenue streams in case of direct marketing and no EEG support are based on the expected electricity market prices. The applied electricity market model (developed by "Energy Brainpool" ([18])) uses the fundamental model "Power 2 Sim", modelling future electricity markets according to scenarios. It carries out hourly calculations until the year 2050 and takes into account all European countries. It is based on the input from renowned studies and databases such as the "EU Energy, Transport and Emission GHG Trends to 2050", Eurostat or ENTSO-E. CO_2 certificate and fuel prices follow forward markets until 2025.

([16]) Decision of 27.09.2022, C(2022) 6946 final, State Aid SA.102303 (2022/N) Germany EEG 2021 amendments: Easter Package 2022 - Early Bird Measures (OJ C 416, 28.10.2022, p. 5). Available at: https://ec.europa.eu/competition/state_aid/cases1/202243/SA_102303_503CD783-0000-C976-8DB2-F82569A32D97_83_1.pdf.

([17]) Decision of 27.09.2022, C(2022) 6946 final, State Aid SA.103086 (2022/N) Germany EEG 2021 amendments: Additional round of solar PV tenders in 2022 (OJ C 416, 28.10.2022, p. 5-6). Available at: https://ec.europa.eu/competition/state_aid/cases1/202242/SA_103086_C085D583-0200-CFB6-9722-D25B335BAD8F_39_1.pdf.

([18]) "Energy Brainpool" is an independent energy market expert, focused on electricity and energy trading in Europe, with an expertise in the analysis, forecasting and modelling of energy markets and prices: https://www.energybrainpool.com/unternehmen/ueber-energy-brainpool.html.

Exchange rates are also relevant, as certain commodities (such as fossil fuels used in electricity production) are not traded in EUR. As there are no indications about future exchange rate developments (*e.g.* in the "World Energy Outlook") the average over the last 10 years is taken as an assumption for 2025, which also corresponds to current developments on the forward markets. Taking into account the hourly generation profile of variable renewable energies allows for realistic results with regard to their actual production and their influence on electricity market prices. As regards weather conditions, the scenarios are based on data of the year 2009, which corresponds to a long-term average in central Europe.

(36) In cases where the share of self-consumption is high, the avoided purchase costs are taken into account in the calculation of the funding gaps.

(37) All costs and revenues are discounted by using the Weighted Average Cost of Capital ('WACC') as discount factor. An appropriate value of the WACC in case of direct marketing and no EEG support, is considered to be 7%, based on research and surveys executed by Energy Brainpool, referred to by Germany.

(38) For investments in new RES installations, Germany argues that the counterfactual situation consists of no execution of the project, because without support the projects would face an increased financing risk, despite the current high level of electricity market prices. Hence, the net present value ('NPV') of the counterfactual scenario is zero, and the funding gap equals the NPV of the project without EEG support. In general, State aid guarantees a minimum revenue for the projects, which means their execution is more certain and it is easier for them to obtain financing.

(39) For support granted to new installations, the NPV is calculated over the expected economic lifetime of the project of 20 years. Existing biomass installations that participate in biomass tenders, can apply for follow-up support for 10 years.

(40) Germany also provided the calculations of the funding gap in case EEG support is granted. There are two adjustments taken into account in the calculation of the NPVs of the reference projects in that case.

(a) First, to calculate the revenues, in case an installation (below 100 kW) benefits from a feed-in tariff, it implies that the producers of electricity are not obliged to directly sell their electricity on the market. Hence, they do not incur the cost of direct marketing. As a consequence, Germany adapts the EEG support in the law by subtracting 0.2 ct/kWh (biomass, biomethane) or 0.4 ct/kWh (solar, wind) in order to take into account the avoided cost of direct marketing for installations that are subsidised through a feed-in tariff (see recital (23)).

(b) Second, a lower value of the discount factor used in the NPV calculations, reflecting the lower financing risk in case EEG support is granted. The exact value of the WACC differs per technology and is explained in more detail in the sections describing the aid per technology.

(41) Deviations from the above methodology or specificities for certain technologies, are further specified in the technology-specific sections below.

2.4. Description of tendered aid per technology

(42) Where aid is granted by way of tenders, installations will be eligible for support only if they have made a successful bid. Tenders will be conducted by the Federal Network Agency (*Bundesnetzagentur*, '*BNetzA*'). The calls will invite single, sealed bids. The bid relates to the reference value that serves to determine the level of the premium after deduction of the market price. The aid application, which in this case corresponds to the submission of a bid, must be done before the start of the project. The bid must include the name, address, telephone number and e-mail address of the bidder (as well as the registered office and the name of a natural person representing the bidder in the case of a legal person), the name of the technology for which the bid is submitted, the tender date, the bid quantity in kilowatt (kW), the bid value in EUR ct/kWh, the location of the installation and the name of the competent transmission system operator. There may also be specific requirements depending on the technology being bid for.

(43) The only selection criterion in the tender procedure is the value of the bid. The lowest bids will be awarded funding until the amount of installed capacity that is being tendered is reached. There are specific rules for undersubscription of onshore wind, ground-based and rooftop solar PV (as of 2024, see recitals (76)(b) and (85)), biomethane, biomass and innovation tenders. In principle, in all tenders, the amount of funding corresponds to the individual bid (pay-as-bid principle).

(44) Once a bid has been accepted, the project must be implemented within a specified timeframe. In the interest of maximising the rate of project implementation, a contractual penalty applies in the event of non-completion of a project.

(45) Germany explains that, in line with points 107(b)(iv) and 107(b)(v) of the CEEAG, small renewable energy communities (up to 6 MW installed capacity for RES other than wind, or up to 18 MW installed capacity for wind) are exempted from participating in tenders. As a consequence, the existing privilege in the EEG 2021 for energy communities when participating in onshore wind tenders (applying pay-as-clear rule, i.e. the rule that the amount of funding corresponds to the highest bid at a given tender date) is abolished in the EEG 2023.

(46) The EEG 2023 still allows operators of onshore wind installations (see recitals 79 and 80 in the decision in case SA.57779), and ground-based solar PV installations (see recitals 21 and 22 of the decision in case SA.64376) to offer the affected municipalities an amount up to 0.2 ct/kWh of electricity produced from the installations (§6 EEG 2023). If they do so, the operators are reimbursed of these costs by the respective system operator. Germany submits that, through those payments, the affected municipalities would be remunerated for the impact (*e.g.* visual impact) of new installations on their territory, which could resolve problems related to public acceptance, faced by RES installations. Moreover, it creates additional incentives for the designation of new areas for RES development and facilitates the installation of RES projects in existing areas, which at the same time will increase the level of competition in the tenders.

(47) As in the EEG 2021, different RES support measures and RES tenders are organised per technology, except for the innovation tenders in which installations based on all RES sources, as well as storage, can participate: onshore wind (section 2.4.1), ground-based solar PV (section 2.4.2), rooftop solar PV (section

2.4.3), biomass/biogas (section 2.4.4), biomethane (section 2.4.5), and innovation tenders (section 2.4.6).

(48) Germany argues that due to its geographical location, as well as network and system integration considerations, it is important to have a diverse mix of technologies ([19]). In particular, onshore wind and solar PV complement each other's feed-in (both throughout seasons and various weather conditions), whereas biomass and biomethane provide a dispatchable production source (that can be used regardless of weather conditions) but have much higher operating costs. Germany refers to their experience with past joint tenders for solar and onshore wind, in which only solar projects were awarded. According to Germany, a particular difficulty is the internalisation of system integration costs into the tenders. Germany submits that these arguments become more significant the higher the share of RES in electricity production. A higher share of RES (in particular solar and wind energy) in the system creates higher supply volatility.

(49) In addition, Germany also argues that given the significant cost differences between different technologies, it would not be opportune to have one joint tender for all technologies together as this would lead to overcompensation of the cheaper technologies, even in the case a price cap would be introduced in the tender procedure (since the cheaper technologies would anticipate that they are needed to obtain the required RES volume put on tender and would have an incentive to bid at the price cap). If tenders are designed as competitive bidding processes, the tender results show the difference in costs between different technologies. The Commission observes that this has been so far the case in Germany, and notes that the tenders of spring 2022 had the following outcomes: 5.19 ct/kWh for ground-based solar PV, 5.85 ct/kWh for onshore wind, 8.53 ct/kWh for rooftop solar PV, 15.8 ct/kWh for biomass and 17.8 ct/kWh for biomethane ([20]). This shows that each technology has a cost difference of at least 10%.

(50) Since the system of EEG levies has been abolished and RES projects are financed through the general State budget, the prohibition to self-supply has been abolished for all technologies.

(51) Finally, the EEG 2023 increases the scope for cross-border cooperation by amending certain parameters in the cross-border tenders (see recitals 122 to 124 of the decision in case SA.57779). The EEG 2023 provides for the adoption of a regulation opening up to 20% (instead of 5%) of annual tendered capacity to bidders from other EU Member States with which Germany has concluded a cooperation agreement under Article 5 of the Renewable Energy Directive 2018/2001/EU ('RED II') ([21]). The tenders can be jointly organised or held by each partner State separately. In contrast to the previous provisions under the

([19]) The problems are amplified by the fact, that most of Germany's industry and energy consumers are located in the South of the country and the majority of RES generation is located in the North.

([20]) All tender outcomes are available on the website of the BNetzA: https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/Ausschreibungen/Wind_Onshore/BeendeteAusschreibungen/BeendeteAusschreibungen_node.html.

([21]) Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast), OJ L 328, 21.12.2018, p. 82.

EEG 2021, support does not have to occur any longer under the principle of reciprocity and cooperation is no longer limited to tenders. Cooperation can also take other forms of financial participation.

2.4.1. Onshore wind

(52) As shown in Table 3, Germany will increase significantly the tender volumes for onshore wind as of 2023: the tender volume increases from 5 160 MW in 2022 to 12 840 MW in 2023 and 10 000 MW as of 2024. Also the number of tender rounds increases: funding will be tendered in four annual rounds (in February, May, August and November), to which the annually tendered capacity will be apportioned equally. Further adjustments to the tender volumes can be made according to the following rules: as of 2024, the tender volume can be increased by the volume not awarded in the onshore wind tenders of the respective preceding year; the tender volume can be decreased by the volume awarded by other Member States to onshore wind projects located within Germany in the respective preceding year, by the volume of onshore wind projects that were put into operation in the respective preceding year and for which the reference value was not determined in the tender, and by the volume awarded to onshore wind projects in innovation tenders in the respective preceding year. Notwithstanding the foregoing, the BNetzA can increase or decrease the tender volume by no more than 30%, if the annual targets as regards RES electricity production and the capacity expansion paths for solar energy are respectively under- or overachieved or if the energy demand increases respectively faster or slower than expected.

(53) As in the EEG 2021, installations participating in the tenders must have obtained approval under the Federal Emissions Control Act (*Bundes-Immissionsschutzgesetz*, '*BImSchG*').

(54) In order to take into account the significant increase in investment cost (capex) to construct the onshore wind turbines, the bid cap has been raised by 15% to 6.76 ct/kWh for 2023 (compared to 5.88 ct/kWh in the EEG 2021) with an annual decrease of 2% as of 2025. As in the past, the bid cap is calibrated to a level approximately 20 to 25% above the levelised cost of energy ('LCOE') of an average installation in a region with average wind quality. This margin is necessary to not unduly constrain competition in the tenders. Keeping the level of the bid cap at the level of the EEG 2021 would have made the margin shrink to 4% in 2022, which is too low to ensure effective competition. The proposed increase in the bid cap ensures that the margin between the LCOE of new installations and the bid cap is restored at 20%. The degressivity of the bid cap is suspended in 2023 and 2024. Germany argues that the suspension is necessary because of the current and the short term expected high inflation rates, which will prevent production costs to decline in the short run. The BNetzA may adjust the bid caps by a maximum of 25% if the preceding three tender rounds have demonstrated that the bid caps used were too high or too low in the light of the EEG 2023 objectives (§85a (1) of the EEG 2023). Based on the results of the preceding three tender rounds, the BNetzA is obliged to decrease the bid cap if the average production costs are significantly below the maximum value, and increase the bid cap if the average production costs are above the maximum

value, in particular if the three preceding tenders were undersubscribed ([22]). The only change vis-à-vis the existing competence to adjust the bid cap in the EEG 2021 is that the maximum adjustment range has been changed to 25% in view of exceptionally high inflation rates experienced recently. The EEG 2023 also introduces a new competence for the BNetzA (§85a (2a) of the EEG 2023): the BNetzA can also adjust the bid cap for onshore wind by a maximum of 10%, if the price of raw materials has increased by more than 15% in the previous year. This additional flexibility is necessary to ensure sufficient competition in the tenders in case of increased prices for input materials needed for the construction of onshore wind installations.

(55) Onshore wind tenders have been generally undersubscribed in recent years. To address the risk of undersubscription, Germany introduced an ex ante volume control mechanism for onshore wind in the EEG 2021 (see recital 71 in the decision in case SA.57779): if there is a risk of undersubscription for a tender, which can be indicated by, inter alia, a limited number of newly granted permits and limited tender participation in the past, the BNetzA can reduce the tender capacity to keep the tender competitive. As a consequence of the introduction of this mechanism in 2021, the tender rounds of September 2021 and February 2022 were oversubscribed. In general, wind growth stalled over recent years amid permitting issues and lack of suitable sites for development, and the tender rounds of May 2022 and September 2022 were again undersubscribed. Germany is currently taking a set of measures to improve the situation, as described in recital (56) below.

(56) To further reduce the risk of undersubscribed onshore wind tenders, apart from keeping the existing volume control mechanism in the EEG 2023, the German government has taken also a set of additional measures, consisting mainly of increasing the areas eligible for onshore wind projects, in order to increase the number of newly granted permits and thus the number of bidders:

(a) The Onshore Wind Energy Act (*Windenergieflächenbedarfsgesetz*, '*WindBG*') has been passed to increase the areas designated for onshore wind projects to 1.4% in 2027 and to 2% in 2032 of Germany's territory, to allow onshore wind projects to be developed without the designation in the planning procedure if the above land allocation targets are not met, and to limit the federated states' discretion in providing for rules establishing minimum distances of onshore wind projects from residential areas.

(b) Permitting and planning procedures will be more tightly framed, *e.g.* the procedural deadlines have become shorter.

([22]) The BNetzA will especially look at the development of bid quantities and bid values. Where data is available, the BNetzA will compare the bid quantity with the amount of existing eligible projects. If the bid quantity decreases strongly, bid values increase and/or if the number of eligible projects does not coincide with the bid quantity, this is regarded as an indicator for bid caps being too low. If bid values decrease strongly or an unusually high share of eligible projects bid into the auction, this can be seen as an indicator for bid caps being too high. In the next step, the BNetzA will determine the cost levels by surveying existing studies on cost data, price indicators, etc. If the indication of an inappropriate bid cap level is verified, the BNetzA will use the data to set an appropriate bid cap level.

(c) The distance between weather radars and onshore wind installations has been reduced, allowing the German weather service to intervene in the permitting procedure only for installations within a radius of 5 km (instead of 15 km), as of 2024.

(d) Several measures have been taken regarding radio navigation systems, *e.g.* reduction of the protected areas around radio navigation systems, demolition and modernization of some radio navigation systems, change in the technical parameters used to determine whether an onshore wind installation interferes with a radio navigation system.

(e) The Federal Armed Forces (*Bundeswehr*) have launched a review of their internal procedures and requirements concerning, inter alia, low-level flying routes for helicopters, and take-off and landing procedures.

(f) The Federal Nature Conservation Act (*Bundesnaturschutzgesetz*, '*BNatSchG*') has been amended to standardise the principles used to assess the compatibility of species protection with the development of onshore wind projects. As a consequence, more projects will be realised with mitigation measures and less projects will have to be abandoned.

(57) Germany applies the reference yield model ('*Referenzertragsmodell*') for the calculation of the reference value of tendered onshore wind projects: bids are submitted in the tenders as if the wind projects had a fictitious 100% wind site quality. After the projects have been awarded aid under the measure, their bid is transformed to the actual reference value by multiplying them with a factor depending on the actual estimated wind quality of the site. In the EEG 2021, the wind qualities ranged between 60% and 150% (see recital 73 in the decision in case SA.57779).

(58) As stated in recitals 74 and 75 of the decision in case SA.57779, Germany submits that the reference yield model compensates installations in less windy areas, mainly in the South of Germany, for the lower wind quality and can therefore support a more balanced installation of wind turbines, which would be advantageous in terms of public acceptance and network constraints. The reference yield model will be analysed in the evaluation (see section 2.12) to assess its actual contribution to the advantages claimed by Germany and balance them against potential unintended negative consequences.

(59) Germany implemented two changes to the reference yield model in the EEG 2023:

(a) the correction factor for sites with a 60% wind quality is increased from 1.35 to 1.42; and

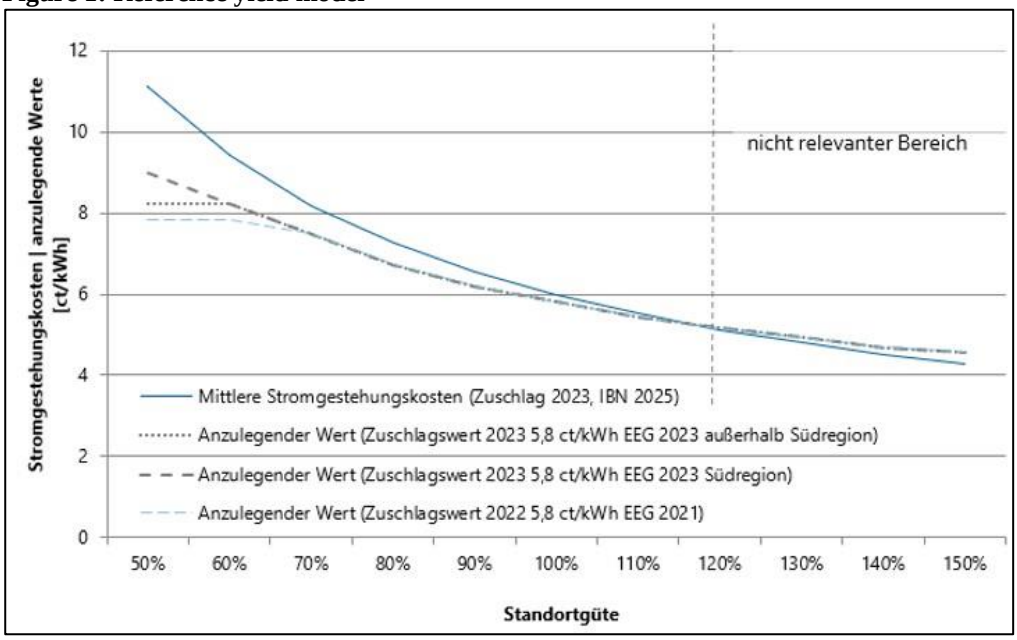
(b) an additional category of sites with wind quality of 50% and correction factor of 1.55 is added but only applies to tendered onshore wind sites in the South of Germany.

(60) Germany submits that for sites with a wind quality of 60%, the correction factor applied so far has been too low so that the development of these sites has lagged

behind. Referring to a study by the German Federal Environment Agency ([23]), Germany submits that 30% of potentially suitable areas for the expansion of onshore wind energy is located in areas with lower wind quality (*i.e.* wind quality below 70%).

(61) In order to stimulate the development and realisation of projects also at these sites, the correction factor at 60% has been increased from 1.35 to 1.42 in the EEG 2023. Even with the new correction factor at the 60% wind quality site, the correction factor curve does not fully compensate for the lower yields. The adaptation at the 60% site will improve the competitiveness of lower quality projects without fully compensating for the shortfall in revenues. Consequently, investors are incentivised to prioritise the development of more profitable sites. A linear extrapolation of the correction factors between 70% and 80% was chosen for the determination of the adjusted correction factor. This is shown in Figure 1 below, which presents the levelised cost of electricity ('LCOE') and the correction factors of the reference yield model applied in the EEG 2021 and EEG 2023.

Figure 1: Reference yield model



Source: Notification documents of the German authorities

(62) In addition, since onshore wind projects in the South of Germany are at a competitive disadvantage compared to the North, leading to an imbalanced and delayed ramp-up of wind deployment in the South under the current system, Germany has added an additional wind quality site of 50%, which applies only to the South of Germany. The South of Germany is defined in Annex 5 to the EEG and consists of all or part of the following federated states ('*Länder*'): Baden-Württemberg, Bayern, Hessen, Rheinland-Pfalz and Saarland.

(63) Germany claims that, due to competitive disadvantages, there is currently only limited expansion of onshore wind turbines in southern Germany. Investors would have very low expectation rates regarding their projects to be developed in

([23]) Umweltbundesamt (2013), *Onshore wind potential.*

the South. According to Germany, the competitive disadvantage for investors in the South stems from the fact that (i) wind quality is lower in the South, (ii) geographical characteristics of the South (forests, mountainous landscape) involve higher costs for developing these areas, and (iii) development areas are smaller (*e.g.* in Bavaria there are stricter conditions to develop land since a higher distance between wind parks and residential zones has to be respected).

(64) Germany submitted funding gap calculations showing the cost difference between reference projects in the South and North of Germany. For an onshore wind turbine of the same height (140 m) and rotor diameter (138 m), the same investment cost (1 558 EUR/kW), the average wind site quality is 77% outside the South region versus 65% in the South region, the LCOE is EUR 7.9 ct/kWh outside the South region versus EUR 9.7 ct/kWh in the South region; this leads to a funding gap of EUR 1.3 million and EUR 2.6 million for an onshore wind turbine in the North and South respectively, in case of no EEG support. This demonstrates the higher funding needs for the development of onshore wind in the South.

(65) In addition, as also mentioned in the decision in case SA.57779 (recital 337), Germany submits that it is still facing important grid constraints, increasing the need for congestion management measures and invoking important system integration costs. One of the reasons is the increase in onshore wind installations in northern Germany, while most consumption intensive centres are located in the south. Also the delays in grid expansion and the shutting down of nuclear power plants in the south of Germany contribute to increased system integration cost. Germany submitted studies and calculations regarding the amount of savings on system integration costs, in case more onshore wind would be developed in the South, avoiding the transfer from North to South on a congested network. The calculations show that a shift of 8 GW of wind turbines from the North to the South would reduce system integration costs by 1.2% or almost EUR 200 million per year between 2018 and 2025 ([24]). Based on the data and analysis of this study, Germany has calculated that the additional cost to support onshore wind energy production in the South would amount to EUR 80 million for the period 2023-2027, *i.e.* approximately up to EUR 16 million per year. These additional costs only arise if wind turbines are subsidized via the EEG over the entire period under consideration, *i.e.* if the electricity price on the power exchange is always lower than the reference value. Germany argues the additional costs thus represent the maximum cost and can be considered an extremely conservative assumption. The net savings of the measure would be about EUR 184 million per year.

(66) On the basis of the information and calculations submitted regarding the cost differences between North and South and the savings in terms of system integration costs, Germany argues that the promotion of onshore wind development in the South region, through the additional 50% wind quality sites in the South in the reference yield model, is necessary to develop additional sites in the Southern region in order to achieve the European and national energy and climate targets.

([24]) E-Bridge, IFHT, RWTH Aachen, EWL Duisburg/Essen, and Institut für Energierect, 2017, "*Ergebnisse für die Szenarien 2018 und 2025*".

(67) Germany provided a funding gap analysis for a typical onshore wind installation over the lifetime of 20 years. The calculations are based on the assumption that the projects will be awarded a contract in 2023 and an implementation time of approximately 20 to 24 months, *i.e.* in 2025. The reference project consists of an installation with a rated output of 4.5 MW, a hub height of 139 m and a rotor diameter of 139 m. As regards the location of the reference onshore wind power plant, a site with a wind quality of 76% has been chosen; this corresponds to the average wind quality for all commissioned plants in the period 2019 until mid-2022. The investment costs (capex) are estimated at EUR 1 695/kW, in line with the latest survey conducted by Deutsche WindGuard in spring 2022. The main investment costs include the cost of the wind turbine, as well as transport and installation costs. Operating costs (opex) include maintenance costs, operation and management costs, insurance costs, rent. They include fixed and variable components. According to the data collected and submitted by Germany, operating costs are higher during the second decade, compared to the first 10 years of operation. The fixed shares are EUR 32/kW during the first decade of operation and EUR 40/kW during the second decade. The revenue-dependent shares vary according to the energy yield and revenues obtained per kWh. They amount to EUR 7/MWh during the first decade and EUR 9/MWh during the second decade of operation. The parameters of the relevant reference project are summarised in Table 4.

Table 4: Funding gap analysis – reference project onshore wind installation > 1MW

Reference project	**Onshore wind installation (> 1 MW)**
Capacity (kW)	4 500
Lifetime project (y)	20
Energy yield (MWh/y)	11 358
Configuration installation: • **Hub height (m)** • **Rotor diameter (m)** • **Location (wind quality)**	 139 139 76%
Investment cost (capex) (EUR/kW)	1 695
Operating costs (opex): • **Fixed (EUR/kW/y)** • **Variable (EUR/MWh/y)**	 32 - 40 7 - 9
Share of self-supply	0%
Funding gap without EEG aid (EUR)	**-2 608 182**

Source: Notification documents of the German authorities

(68) The funding gap has been calculated according to the same methodology as described in section 2.3.3, and is presented in Table 4. As is clear from Table 4, without EEG support, the reference onshore wind installation is not profitable over its economic lifetime. It is also clear from the underlying data provided by Germany that the notified measures cover primarily the initial fixed investment costs. The operating costs over the lifetime of the investment represent 28% of the total cost of the relevant reference project.

(69) Germany also submits that, even though the prohibition to self-consumption has been abolished (as a result of abandoning the EEG levy ([25])), self-consumption is irrelevant in the case of electricity production from onshore wind turbines. Also in the future, Germany expects that the share of self-consumption in the area of onshore wind will continue to play a very minor role, since self-consumption requires a separate physical grid connection to the place of consumption and wind turbines will continue to be installed almost exclusively in areas located further away from potential electricity consumption.

(70) To make sure that onshore wind projects are implemented effectively, a guarantee payment of 30 EUR/kW applies and awarded onshore wind installations must be built within 30 months of the tender award.

2.4.2. Ground-based solar PV

(71) As shown in Table 3, and similar as for onshore wind, Germany will increase significantly the tender volumes for ground-based solar PV as of 2023: the tender volume increases from 3 600 MW in 2022 to 5 850 MW in 2023, 8 100 MW in 2024, and 9 900 MW thereafter. The number of tender rounds is kept at three per year (in March, July and December), to which the annually tendered capacity will be apportioned equally. Further adjustments to the tender volumes can be made according to the rules as for onshore wind projects (see recital (52)).

(72) Tenders are open to installations, with a capacity between 1 MW and 20 MW, for which the operator is the owner of the utilised plot or for which the owner of the plot has agreed to the submission of the bid. However, in 2023, as part of the crisis measures to increase the electricity production from other sources than natural gas (see recital (8)), installations with a capacity up to 100 MW are exceptionally allowed to participate in the ground-based solar PV tenders.

(73) In contrast to onshore wind installations, solar PV installations do not have to obtain approval under the Federal Emissions Control Act. Participation is open to ground-mounted installations and PV systems installed on other types of physical structure.

(74) In the EEG 2023, the segment of special solar installations (‘*besondere Solaranlagen’*), which was part of the innovation tender in the EEG 2021, is included in the regular ground-based PV tender. This broadens the pool of solar installations that can participate in the ground-based solar PV tenders. These are floating solar installations, installations installed above a parking area, installations installed above moorlands (moor-PV), and installations above a surface which is used in parallel for agricultural purposes (agri-PV). These innovative solar installations are often more expensive than the traditional ones. As a consequence, a bonus is foreseen for the following installations:

([25]) Until mid-2022, the financing of the remuneration for EEG electricity was based on the polluter-pays principle, whereby the financial burden was shared among all electricity consumers on the basis of their electricity consumption through the EEG levy (described in detail in the decisions in cases SA.38632 (recitals 11 to 73) and SA.45461 (recitals 139 to 143)).

(a) Agri-PV: the reference value is increased by 1.2 ct/kWh in 2023, by 1 ct/kWh in 2024, by 0.7 ct/kWh in 2025 and by 0.5 ct/kWh thereafter ([26]);

(b) Moor-PV: the reference value is increased by 0.5 ct/kWh as of 2023.

(75) The bid cap is calculated as the average of the highest bid awarded in each of the last three tenders increased by 8%, but can never be higher than 5.9 ct/kWh. The BNetzA may adjust the bid caps by a maximum of 25% if the preceding three tender rounds have demonstrated that the bid caps used were too high or too low (§85a (1) of the EEG 2023). In practice, the BNetzA will analyse the results of the previous tenders, the price development in terms of raw materials (e.g. steel price), as well as specific investment and technology costs (e.g. prices for PV modules). The only change vis-à-vis the existing competence to adjust the bid cap in the EEG 2021 is that the maximum adjustment range has been changed to 25% in view of exceptionally high inflation rates experienced recently.

(76) The EEG 2021 did not envisage a volume control mechanism to ensure the competitiveness of the 'regular' ground-based solar PV tenders, except for the third round of 2022, since the June 2022 tender was significantly undersubscribed ([27]). Germany does not envisage a volume control mechanism for solar PV tenders for the year 2023, but includes a volume control mechanism in the EEG 2023 as of 2024.

(a) Regarding the year 2023, Germany submits that no undersubscription is expected in 2023, in particular since the category of eligible installations has become broader by including also installations up to 100 MW and by including the special solar PV installations. Precise estimates are not possible, since the project pipeline for ground-based solar PV installations is not recorded officially and no permit under the BImSchG is required. Moreover, additional measures have been taken to extend the available surface areas on which ground-based solar PV installations can be built, most importantly, the area along highways and railways on which ground-based solar PV installations can be built has been extended from 200 m to 500 m. This surface extension applies as of 2023, and is thus expected to have immediate effect. Germany provided an estimate of the impact of this extension on the potential development of solar PV on these areas, which would unlock between 50 and 125 GW of additional ground-based solar PV capacity as of 2023, since the approval period for development plans and building permits is relatively short (6 months to 1 year) ([28]).

([26]) This bonus relates only to certain types of Agri-PV installations, namely the ones where the solar modules are mounted above the area used for agriculture in such a way that the ground below can be used for agricultural purposes (in practice, the installations should be installed at least 2.1 meters above the surface).

([27]) The second tender round in the ground-based solar PV segment was significantly undersubscribed (see recital 21 in the decision in case SA.103086).

([28]) Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW), Bosch & Partner GmbH, 2019, „*Untersuchung zur Wirkung veränderter Flächenrestriktionen für PV-Freiflächenanlagen*". Available at: https://www.zsw-bw.de/fileadmin/user_upload/PDFs/Aktuelles/2019/politischer-dialog-pv-freiflaechenanlagen-studie-333788.pdf.

(b) As of 2024, a volume control mechanism will be introduced for ground-based solar PV tenders, which will work in a similar way as the mechanism applied in the third round of solar PV tenders in 2022, approved in the decision in case SA.102303 (see recitals 20 to 24 of that decision): if two tender rounds have been undersubscribed, the tender volume of the subsequent tender is limited to the average volume awarded in the previous two rounds; in case an upward market trend is observed, an additional 'trend' volume, equal to the difference between the awarded volumes in the previous two rounds, is added, in order to avoid that positive market developments are penalised by the volume control mechanism. Compared to the mechanism approved in the decision in case SA.102303, two additional clauses are introduced in the ground-based solar PV mechanism in the EEG 2023: first, the correction only applies in case of a significant undersubscription (*i.e.* at least 10%), and second, further regulatory changes, which could free up additional opportunities for ground-based solar PV development, should be taken into account when setting the tender volumes. The latter implies that in case significant regulatory changes take place which would open up more potential areas for ground-based PV installations, the BNetzA, having the best view on the pipeline of potential projects in the market, has the power to reflect these changes in the upcoming tender volumes in order to speed-up as quickly as possible the development of ground-based solar PV projects.

(77) Germany provided figures on the funding gap for two typical regular ground-based solar PV installation (with a capacity below and above 20 MW) and for two special solar installation in the agri- and moor-PV segment over their economic lifetime of 20 years. The following reference projects have been used, which represent the average typical size of an installation:

(a) Regular ground-based installation of 6 400 kW, with average energy yield of 6 080 MWh per year, representative for installations with a capacity between 1 MW and 20 MW;

(b) Regular ground-based installation of 80 MW, with average energy yield of 76 000 MWh per year, representative for the installations with a capacity between 20 MW and 100 MW ([29]), which will be allowed to participate in the 2023 solar PV tenders;

(c) Agri-PV installation of 1 500 kW, with an average yield of 1 350 MWh per year;

(d) Moor-PV installation of 6 400 kW, with average energy yield of 6 080 MWh per year.

([29]) As reference installation, Germany submitted the details for a plant of 80 MW, since it is assumed that project developers will try to exploit the permitted size of 100 MW as much as possible, but the full size cannot always be used for site-specific reasons. The PV system sizes of these very large projects will typically vary because of land restrictions and relatively narrow and dense development of buildings and other land-uses in Germany. In addition, there are land use trade-offs at the municipal level. Therefore, the average size of the installations in the range 20 MW to 100 MW will stay below the maximum permissible plant size.

(78) Germany submits that the share of self-consumption in all these installations is expected to be very low, since regular ground-based and special agri/moor-PV installations are typically built further away from points of consumption, so the electricity produced is usually fed into the grid. Due to the lack of data and literature, 100% feed-in into the electricity grid is assumed, but the degree of self-consumption in large ground-based installations will be investigated during the evaluation.

(79) The funding gaps have been calculated according to the same methodology as described in section 2.3.3, and are presented in Table 5, together with the characteristics of the reference installations for regular ground-based solar PV and agri- and moor-PV installations.

Table 5: Funding gap analysis – reference projects ground-based solar PV > 1MW

Reference project	**Regular ground-based PV installation (1-20MW)**	**Regular ground-based PV installation (20-100MW)**	**Agri-PV installation (> 1MW)**	**Moor-PV installation (> 1MW)**
Capacity (kW)	6 400	80 000	1 500	6 400
Lifetime of the project (y)	20	20	20	20
Energy yield (kWh/kW/y)	950	950	900	950
Investment cost (EUR/kW)	650	650	1 200	850
Operating costs (EUR/kW/y)	15	12	15	15
Share of self-supply	0%	0%	0%	0%
Funding gap (EUR)	**-896 300**	**-11 680 900**	**-1 147 400**	**-2 329 000**

Source: Notification documents of the German authorities

(80) According to Germany, Table 5 shows that the funding gap of each of the reference projects turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical regular ground-based solar PV installations and the special solar PV installations are not profitable over their economic lifetime. Still according to Germany, the underlying data it provided show that the notified measures cover primarily the initial fixed investment costs. The operating costs over the lifetime of the investment represent 20%, 33%, 14% and 35% of the total cost of the relevant reference project for the two regular ground-based solar PV projects and for the agri- and moor-PV installations respectively.

(81) In order to increase the tender participation while ensuring that projects are implemented, the EEG 2021 introduced simplified tender procedures for both the bidders and the BNetzA, and some special arrangements for 2021 and 2022 in the aftermath of the Covid-19 pandemic. The EEG 2023 keeps the simplifications and

requires for ground-based solar PV tenders a guarantee payment of EUR 50/kW and an implementation period of 24 months (a penalty in the form of a reduction of 0.3 ct/kWh in the bid applies when the implementation takes more than 18 months).

2.4.3. Rooftop solar PV

(82) The EEG 2023 keeps the separate tender category of rooftop solar PV, introduced in the EEG 2021. Participation is open to solar PV systems installed on buildings or noise-protection walls up to 1 MW. The maximum capacity of installations is 20 MW. In contrast to the EEG 2021, the option for installations with a capacity between 300 kW and 750 kW to participate in tenders has been abolished, since these installations have the possibility to apply for a full feed-in bonus (see section 2.5.3).

(83) As shown in Table 3, Germany will decrease the tender volumes for rooftop solar PV as of 2023: the tender volume decreases from 2 300 MW in 2022 to 650 MW in 2023, 900 MW in 2024, and 1 100 MW thereafter. The reduction in the tender volume is a result of the significantly undersubscribed tender rounds in 2022; Germany brought the tender volume of 2023 in line with the average volume awarded in the context of the 2022 rooftop solar PV tenders. The number of tender rounds is kept at three per year (in February, June and October), to which the annually tendered capacity will be apportioned equally. Further adjustments to the tender volumes can be made in the same way as for onshore wind projects (see recital (52)).

(84) As in the EEG 2021, the bid cap is set at 9.0 ct/kWh with an annual decrease of 1%. The degressivity is however suspended in 2023 in order to take into account the current and in the short term expected high inflation rates, which will prevent production costs to decline in the short run. The BNetzA may adjust the bid caps by a maximum of 25% if the preceding three tender rounds have demonstrated that the bid caps used were too high or too low (§85a (1) of the EEG 2023). In practice, the BNetzA will analyse the results of the previous tenders, the price development in terms of raw materials (e.g. steel price), as well as specific investment and technology costs (e.g. prices for PV modules). The only change vis-à-vis the existing competence to adjust the bid cap in the EEG 2021 is that the maximum adjustment range has been changed to 25% in view of exceptionally high inflation rates experienced recently.

(85) As in the case of ground-based solar PV, the EEG 2021 did not envisage a volume control mechanism to ensure the competitiveness of the ‘regular’ rooftop solar PV tenders, except for the third round of 2022, since the April 2022 and August 2022 tenders were significantly undersubscribed. Germany commits to apply a volume control mechanism for solar PV tenders in the EEG 2023. Germany submits that the reduction in the tender volumes as of 2023 ensures that the future rooftop solar PV tenders are not expected to be undersubscribed, since the 2023 tender volumes have been brought in line with the average tender volumes in 2022. Nevertheless, in order to limit the risk of uncompetitive tenders in the near future, Germany has committed that, as of 2024, as soon as two rounds of rooftop solar PV tenders are significantly undersubscribed, a volume control mechanism, similar to the one that applies for ground-based solar PV tenders (see

recital (76)(b)), will be introduced in the EEG 2023. Significant undersubscription is defined in the same way as for ground-based solar PV tenders.

(86) Germany provided figures on the funding gap for a typical regular rooftop solar PV installation over its economic lifetime of 20 years. Germany submits that the self-supply potential for large rooftop solar PV installations is expected to be very limited ([30]), but, similar as for large ground-based solar PV installations (see recital (78)), will be subject of the evaluation. The funding gap has been calculated according to the same methodology as described in section 2.3.3, and is presented in Table 6, together with the characteristics of the reference rooftop solar PV installation.

Table 6: Funding gap analysis – reference projects rooftop solar PV > 1MW

Reference project	**Rooftop solar PV installation (> 1 MW)**
Capacity (kW)	1 250
Lifetime of the project (y)	20
Energy yield (kWh/kW/y)	900
Investment cost (EUR/kW)	790
Operating costs (EUR/kW/y)	15
Share of self-supply	0%
Funding gap (EUR)	**-395 300**

Source: Notification documents of the German authorities

(87) According to Germany, Table 6 shows that the funding gap of the reference project turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical rooftop solar PV installation is not profitable over the economic lifetime. Still according to Germany, the underlying data it provided show that the notified measures cover primarily the initial fixed investment costs. The operating costs over the lifetime of the investment represent 20% of the total cost of the relevant rooftop solar PV reference project.

(88) In order to increase the tender participation while ensuring that projects are implemented, the EEG 2021 introduced simplified tender procedures for both the bidders and the BNetzA. In this respect, rooftop solar PV tenders changed from a bidder- to a project-based procedure, whereby a change of location is no longer possible. A guarantee payment (amount per bid quantity) of EUR 35/kW needs to be provided by the beneficiary to the State. While the implementation deadline and penalties have been abolished, rooftop solar PV awards are permanently bound to the project site that was the subject of the bid and cannot be transferred to other sites; moreover, there is a maximum duration of the support, counting as of the day of the award of the project (instead of the day of start of the operations), which ensures that projects are implemented as soon as possible.

([30]) For example, for large commercial rooftop solar PV installations, self-consumption is often not possible, as the owners and occupants of the buildings are usually different companies.

2.4.4. Biomass and biogas

(89) As shown in Table 3, the tendered volume for biomass will decrease from 600 MW in 2023 to 500 MW in 2024, 400 MW in 2025 and 300 MW for the following years. In the years 2023 to 2025, there will be two biomass tenders per year, organised on 1 April and 1 October; as of 2026, there will be only one biomass tender per year, organised on 1 June. For the years 2023 to 2025 the annual tender volume will be divided equally between the two tender dates.

(90) Installations with an installed capacity above 150 kW for new biomass and all existing biomass installations will be eligible for support only if they have been selected in tenders. Biomethane plants, as in the EEG 2021, will be excluded from biomass tenders and will have separate dedicated tenders (see section 2.4.5).

(91) The maximum value for existing installations from 1 January 2023 is 18.03 ct/kWh (§39g (5)(3) EEG 2023) and is therefore set at the value from the EEG 2021. As for the other technologies, degressivity is temporarily suspended and will resume on 1 January 2024. The degressivity rate is lowered from 1% in the EEG 2021 to 0.5% per calendar year. In the light of the war of aggression against Ukraine, biomass feedstock prices have risen sharply, justifying the slowdown in degressivity.

(92) The bid cap for new installations is also maintained at the current level and is set at 16.07 ct/kWh from 1 January 2023 (§ 39b EEG 2023). Again, the degressivity will be suspended in 2023 and will resume from 1 January 2024. Here, the current rate of decrease of one per cent per calendar year is maintained unchanged, as technological innovation in new plants leads to the development of cost potentials. As was already the case in the EEG 2021, the BNetzA may adjust the bid caps by a maximum of 10% if the preceding three tender rounds have demonstrated that the bid caps used were too high or too low (§85a (1) of the EEG 2023). In practice, the BNetzA will analyse the results of the previous tenders, the price development in terms of raw materials, as well as specific investment and technology costs.

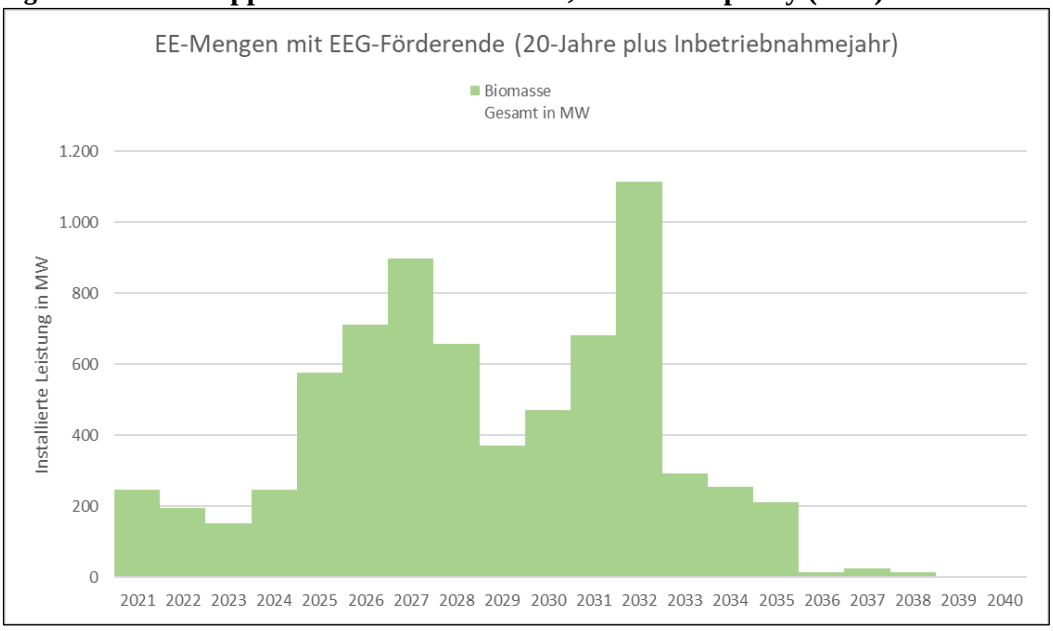
(93) In case of undersubscription of biomass tenders, Germany applies the 80% rule, whereby only the 80% lowest bids will be awarded aid (see recital 107 of the decision in case SA.57779). Germany submits that biomass tenders are primarily aimed at keeping existing biomass plants online, rather than giving incentives to invest in new biomass installations. Existing biomass plants that have already been granted support under the EEG, can decide to abolish their existing contract and take part in a biomass tender, whereby follow-up support for 10 additional years can be granted. An *ex ante* volume control mechanism as for onshore wind and biomethane cannot be applied, since the BNetzA cannot predict when existing biomass plants will leave the current support and participate in the tender for follow-up support. In addition, Germany argues that the 80% (endogenous rationing) rule will not lead to a negative investment spiral, since the aid concerns mainly existing plants. Germany expects a large increase in the participation of existing plants in the biomass tenders as of 2025-2026.

(94) Support for biomass production is primarily designed for existing installations. Keeping existing biomass/biogas plants, which are dispatchable production sources, in the market, helps Germany in resolving its network and system

integration problems. Since these existing plants have high operating costs, without support they will leave the market.

(95) So far, all biomass tenders have been undersubscribed, but, according to Germany, the potential of existing installations that can participate in the tenders is more than sufficient to exploit the volumes offered. The installations may participate in the biomass tenders for follow-up support at any time up to eight years before the end of their contract. Germany has argued that the biomass tenders are primarily aimed at keeping existing biomass plants online, rather than giving incentives to invest in new biomass installations. Therefore, an ex ante volume control mechanism as for onshore wind and biomethane cannot be applied, since it is not clear when existing biomass plants will participate in the tender for follow-up support for an additional 10 years. In addition, for the same reasons, Germany argues that the endogenous rationing rule will not lead to a negative spiral, since the aid concerns mainly existing plants. Germany expects a large increase in the participation of existing plants in the biomass tenders as of 2025-2026.f the initial funding period. As shown in Figure 2, the number of installations that will participate in the tenders for follow-up support will increase in the next years. As a consequence, Germany expects the biomass tenders to become more competitive as well.

Figure 2: End of support biomass installations, installed capacity (MW)



Source: Notification documents of the German authorities

(96) The follow-up support to existing installations is limited to ten years. They can receive an award only if at the moment of the tender they are still entitled to support under the previous support scheme applicable to them for a maximum of eight remaining years.

(97) If existing installations are selected, the new remuneration will replace the previous one. The operators of the existing installations can choose a date of entry into force between 3 (instead of 13 previously) and 36 months after announcement of the winners of the tender. As of the date of the switch, the existing installations will be considered new installations and will be subject to the same requirements as installations entering into operation after 31 December

2022 (approval under the Federal Emission Control Act, biomass type, flexibility, etc.).

(98) Biomass and biogas plants have to obtain a permit according to the Federal Emissions Control Act prior to participation in a tender. The relevant permit has to be registered within a month after it has been issued and at least four weeks before the deadline for the submission of bids.

(99) Installations are also subject to requirements linked to the type of biomass that they use, such as the share of corn or grain that the installation uses to produce biogas (§39i EEG 2023). Compared to EEG 2021, these requirements become more stringent. Only for installations awarded in 2023 the requirement remains the same: the share of corn or grain in total biomass can amount to maximum 40%. For installations awarded in the years 2024 and 2025 this share amounts to maximum 35% and for installations awarded in the years 2026, 2027 and 2028 this share amounts to maximum 30%.

(100) According to Germany, biomass/biogas and biomethane (see section 2.4.5 below) installations in the South need additional support as they are in a disadvantageous situation compared to the North and they are important for grid stability reasons. Therefore, under the South quota rule, 50% of the tender volume for biomass/biogas will be reserved to the South of Germany as of 2023. The South of Germany is defined in the same way as in the case of onshore wind (see recital (62)).

(101) To justify the support targeted at the South, Germany has submitted the following arguments:

(a) Biomass plants in the South are generally of a smaller size (the typical plant in the North has a capacity of 540 kW(el), while the typical plant in the South has a capacity of 460 kW(el)); moreover, biomass and biomethane plants have higher operating costs in the South: the LCOE of a 540 kW(el) biomass plant in the North amounts to 24.79 ct/kWh(el), while the LCOE is 25.80 ct/kWh(el) for a 460 kW(el) plant in the South; the LCOE of a 2 MW biomethane plant in the North amounts to 23.78 ct/kWh(el), while the LCOE is 24.42 ct/kWh(el) for a 2 MW plant in the South. Therefore, plants in the South are unable to compete with plants in the North and less likely to be selected in tenders.

(b) The development of biomass and biomethane installations in the South contributes to making it possible to meet the ambitious energy and climate targets.

(c) Germany still faces important grid constraints, increasing the need for congestion management measures and invoking important system integration costs. Also the delays in grid expansion and the shutting down of nuclear power plants in the South of Germany contribute to increased system integration cost. The more regionally balanced deployment of renewables contributes to network stability and leads to overall cost savings: allocating 1 GW of capacity in biomass and biomethane to the South will save approximately 4% (EUR 35 700 000) of redispatch and

related costs in 2025 only, including 6% decrease in the required grid reserve capacity ([31]).

(d) Biomass and biomethane plants require reliable access to resources (fuel), which will have the same quality and characteristics. Agriculture can be affected by different endogenous and exogenous factors that will change the quality of its products and by-products used for energy generation by biomass and biomethane plants. Especially in the time of the energy crisis the process for biogenic sources and fuels is volatile, which represents another risk factor for these installations. Smaller size of farms and a higher amount of land owners (farmers) impacts negatively the supply of biomass, because it is more cumbersome to secure the right type of fuel. In Bavaria and Baden-Württemberg (both part of the South Region), small farms tend to be dominating, because of the division of inheritance among all descendants that was applied. The agricultural area per farm there is on average 36 ha. In the north of Germany, due to the prevailing right of inheritance there, farms are significantly larger, averaging 81 hectares in Schleswig-Holstein and 73 ha in Lower Saxony ([32]).

(102) Germany has underlined that biomass and biogas installations can make an important contribution to grid stability and reduce system integration costs given also their relative share in the renewable electricity mix, while at the same time contributing to the renewable targets. Moreover, biogas and biomass installations can – if correctly equipped – be operated flexibly so as to adapt production to electricity demand. Basically, they can run at a certain level of their capacity in a stable manner and in case of peak demand or sudden decrease of production from other electricity generation sources, they can increase their production. To this purpose, installations using biogas are in principle only remunerated for the production from 45% of their capacity. This way, as more flexible installations, biogas plants are incentivised to produce during peak times.

(103) The South Quota ('*Südquote*') for biomass introduces separate procedures for cases of under- and oversubscription, reflecting the 80% bid rationing mechanism. If the total bid volume is higher or equal to the envisaged volume for the given tender date (*i.e.* the tender is oversubscribed), the BNetzA separates the bids for projects from the South from the rest. Then, these bids from the South are put in order and awarded contracts until 50% of the tender volumes envisaged for the given tender date are met. In a next step, all bids that have not yet been awarded a contract are put in order and awarded contracts until another 50% of the total tender volume is met (*i.e.* if there are not sufficient bids from biomass projects in the South region, this cannot be compensated by bids from other regions). If the total bid volume is below the envisaged volume for the given tender date (*i.e.* the tender is undersubscribed), the BNetzA first separates the bids for projects from the South from the rest of the bids and then, among the bids from the South, separates the bids for new installations from the bids for existing installations. The bids for existing installations in the South are then put in order and awarded contracts until 20% of the total volume of valid bids is met. Then,

([31]) *Southern quota for biomass in Germany*, r2b energy consulting GmbH & DIgSILENT GmbH, Market & redispatch analysis on behalf of BMWK, 2022.

([32]) See also: https://www.landwirtschaft.de/.

any bids for projects from the South that have not yet been awarded a contract are put in order and awarded contracts until 40% of the total volume of valid bids are met (including the 20% of the first selection round). Then, among all bids that have not yet been awarded a contract, those for existing installations (in any region) are separated, put in order and awarded contracts until a further 20% of the total volume of valid bids are met. Finally, all bids that have not yet been awarded a contract (from all regions for new and existing installations) are put in order and awarded contracts up until 40% of the total volume of valid bids has been met (including the 20% of the previous sentence; not including the up to 40% selected specifically from the South region). The procedure thus combines the 80% bid rationing mechanism with a staged prioritisation, selecting first existing biomass installations in the South, then any biomass installations in the South, then existing biomass installations anywhere in Germany and finally any biomass installations of any sort. The separation into two 40% blocks ensures that a shortfall in bids from the South will not be compensated by allowing more bids from elsewhere.

(104) As mentioned in recital (8), the rules for biogas installations are slightly different in 2023 as part of the crisis measures to increase the electricity production from other sources than natural gas. In 2023, biogas installations are remunerated for all the electricity they produce from 100% of their capacity. This is a crisis measure established as a response to the resource scarcity caused by the Russian war in Ukraine.

(105) Germany provided figures on the funding gap for typical biomass/biogas installations over their economic lifetime of 20 years (for new installations) and 10 years (for an existing installation). The following reference projects have been provided:

(a) New 4 800 kW wood-fired biomass installation, with average energy yield of 31 536 MWh per year, which represent the typical size of a new biomass installation;

(b) New biogas installation of 500 kW, with average energy yield of 4 427 MWh per year, which represent the typical size of a new biogas installation;

(c) Existing biogas installation of 500 kW, with average energy yield of 4 427 MWh per year, which represent the typical size of an existing biogas installation.

(106) The funding gaps have been calculated according to the same methodology as described in section 2.3.3, but also taking into account the flexibility remuneration (see recital (25)), and are presented in Table 7, together with the characteristics of the reference biomass/biogas installations.

Table 7: Funding gap analysis – reference projects biomass/biogas (without EEG)

Reference project	New wood-fired biomass installation of 4 800 kW	New biogas installation of 500 kW	Existing biogas installation of 500 kW
Capacity (kW(el))	4 800	500	500
Lifetime of the project (y)	20	20	10
Energy yield per year (kWh/kW(el))	6 570	3 900	3 900
Investment cost (EUR/kW)	4 800	6 662	999
Operating costs (EUR/kW/y)	657	397	490
Share of self-supply	11%	28%	28%
Funding gap (EUR)	**-48 193 000**	**-7 124 600**	**-2 362 100**

Source: Notification documents of the German authorities

(107) According to Germany, Table 7 shows that the funding gap of the reference project turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical biomass/biogas installations are not profitable over their economic lifetime. Still according to Germany, the underlying data it provided show that the support covers primarily the operating costs, ranging between 71% and 73% in the case of new installations, and amounting to 92% for existing biogas installations. Germany submits that this results in a more environmentally-friendly operating decisions, because otherwise such installations would not operate or would use natural gas.

(108) The operating costs of biomass/biogas installations will be monitored as part of the domestic technology-specific monitoring reports ('*Forschungsvorhaben*'). Should a report show that overcompensation occurs, necessary changes will be implemented in a timely manner, and the aid amount updated at least once a year. At the same time, the actual operating costs of individual biogas installations will not be monitored and the full responsibility of securing necessary supplies will be on them.

(109) To make sure that biomass/biogas projects are implemented effectively, a guarantee payment of 60 EUR/kW applies and awarded biomass/biogas installations must be built within 36 months of the tender award. This deadline can be extended in specific situations.

2.4.5. Biomethane

(110) As shown in Table 3, Germany will increase significantly the tender volumes for biomethane as of 2023: the tender volume increases from 150 MW in 2022 to 600 MW from 2023 onwards. Also the number of tender rounds increases: funding will be tendered in two annual rounds (in April and September), to which

the annually tendered capacity will be apportioned equally. As of 2024, the tender volume increases by the volume not awarded in the biomethane tenders of the respective preceding year.

(111) As Germany has limited experience with biomethane tenders (by the day of the adoption only two biomethane tenders have taken place, one in December 2021 and one in October 2022), the EEG 2023 introduces a volume control mechanism for biomethane tenders to address the risk of undersubscription. Through the volume control mechanism, the BNetzA can reduce the volume of the tender "in case of risk of undersubscription", whereby risk of undersubscription occurs especially in the following situation:

(a) when the sum of the new permits and not awarded volume from previous tender (since previous bid too expensive, since last time excluded from selection, etc.) is smaller than the planned tender volume; and

(b) when the previous tender was undersubscribed.

(112) The adjusted tender volume can then be maximum the sum of the number of newly registered authorisations and the non-awarded part in the previous tender. The application of a similar volume control mechanism as for onshore wind projects (see recital (55)) is justified by the fact that for both types of installations support is granted to new installations and that both types of installations have to be approved under the BImSchG, so that the potential bid capacity is known in advance.

(113) Installations are also subject to requirements linked to the type of biomass that they use, such as the share of corn or grain that the installation uses to produce biomethane (§§ 39i (1) and 39j EEG 2023). The specific requirements are the same as for biogas installations (see recital (99) above).

(114) The bid cap amounts to 19.31 ct/kWh with an annual decrease of 1% as of 2024. This implies that the degressivity is suspended in 2023. Germany argues the suspension is necessary due to the current and in the short term expected high inflation rates, which will prevent production costs to decline in the short run. In addition, for the year 2023, the bid cap under the EEG 2023 is higher than the bid cap that would have been set under the EEG 2021 (it would have been 18.62 ct/kWh for 2023 under the EEG 2021 degressivity). Germany argues here that it still does constrain the competitive bidding process in the context of high inflation and higher costs. In addition, the highest rated power of biomethane installations has been reduced from 15% to 10% of the value of the installed capacity, meaning that they can only produce energy and receive support for 876 full-load hours per year, which incentivises the installations to be highly flexible and operate as peak load power plants. As was already the case in the EEG 2021, the BNetzA may adjust the bid caps by a maximum of 10% if the preceding three tender rounds have demonstrated that the bid caps used were too high or too low (§85a (1) of the EEG 2023). In practice, the BNetzA will analyse the results of the previous tenders, the price development in terms of raw materials, as well as specific investment and technology costs.

(115) Similar as for biomass, Germany introduced a South quota for biomethane. Similar as for biomass/biogas plants, Germany argues that biomethane installations in the South need additional support as they are in a disadvantageous

situation compared to the North and as they are important for grid stability reasons. Therefore, under the South quota rule, 100% of the tender volume for biomethane will be reserved to the South of Germany as of 2023. The South of Germany is defined in the same way as in the case of onshore wind and biomass (see recital (62)). To justify the support targeted exclusively at the South, Germany has submitted the arguments as described in recital (101).

(116) Germany provided figures on the funding gap for typical biomethane installations over their economic lifetime of 20 years. The following reference projects have been used:

(a) Biomethane installation of 500 kW, with average energy yield of 438 MWh per year, which represent the average typical size of a biomethane installation;

(b) Biomethane installation of 2 MW, with average energy yield of 1 752 MWh per year, which represent the common typical size of a biomethane installation used to generate electricity that does not produce biomethane but uses biomethane fed into the grid by biomethanisation installations;

(c) Biomethane installation of 7 MW, with average energy yield of 6 132 MWh per year, which represent the average typical size of a biomethane installation used to generate electricity that does not produce biomethane but uses biomethane fed into the grid by biomethanisation installations;

(d) Biomethane installation of 10 MW, with average energy yield of 8 760 MWh per year, which represent another size of a biomethane installation used to generate electricity that does not produce biomethane but uses biomethane fed into the grid by biomethanisation installations (installations with a capacity of more than 10 MW are only eligible for support if they can be converted to green hydrogen input in the future).

(117) The funding gaps have been calculated according to the same methodology as described in section 2.3.3, and are presented in Table 8, together with the characteristics of the reference biomethane installations. Biomethane installations are exclusively geared towards fully feeding the generated electricity into the grid (so no self-supply). They are providing highly flexible generation which is made available at times of high demand and high prices in the system. If aiming for partial self-consumption, the rational choice would be to invest in cheaper RES technologies.

Table 8: Funding gap analysis – reference projects biomethane

Reference project	Biomethane installation of 500 kW	Biomethane installation of 2 MW	Biomethane installation of 7 MW	Biomethane installation of 10 MW
Capacity (kW(el))	500	2 000	7 000	10 000
Lifetime of the project (y)	20	20	20	20
Energy yield per year (kWh/kW(el))	876	876	876	876
Investment cost (EUR/kW)	1 234	747	600	500
Operating costs (EUR/kW/y)	153	144	136	132
Share of self-supply	0%	0%	0%	0%
Funding gap (EUR)	**-1 438 400**	**-4 439 800**	**-13 748 900**	**-17 653 000**

Source: Notification documents of the German authorities

(118) According to Germany, Table 8 shows that the funding gap of each of the reference projects turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical biomethane installations of 500 kW, 2 MW, 7 MW and 10 MW are not profitable over their economic lifetime. Still according to Germany, the underlying data it provided show that the notified measures cover primarily the operating costs (mainly purchase of biomethane), ranging between 71% and 84% for the four reference projects. Germany submit that this results in a more environmentally-friendly operating decisions, because otherwise such installations would not operate or would use conventional gas. Moreover, the biomethane installations of more than 10 MW are eligible for support only if they can be switched to green hydrogen at low cost in the future.

(119) The operating costs of biomethane installations will be monitored as part of the domestic technology-specific monitoring reports ('*Forschungsvorhaben*'). Should a report show that overcompensation occurs, necessary changes will be implemented in a timely manner, and the aid amount updated at least once a year. At the same time, the actual operating costs of individual biomethane installations will not be monitored and the full responsibility of securing necessary supplies will be on them.

(120) To make sure that biomethane projects are implemented effectively, a guarantee payment of 60 EUR/kW applies and awarded biomethane installations must be built within 36 months of the tender award.

2.4.6. Innovation tenders

(121) As in the EEG 2021, the EEG 2023 provides for the organisation of innovation tenders. As shown in Table 3, Germany will increase the tender volumes for innovation tenders: the tender volume increases from 600 MW in 2022 to

800 MW in 2023, and increases with 50 MW per year as of 2024. The number of tender rounds is kept at two per year (in May and September).

(122) As described in recitals 114 to 116 of the decision in case SA.57779, installations providing specific services to the grid (for example, stable or flexible production by linking intermittent RES production with storage), can participate in the innovation tenders. In contrast to the EEG 2021, the special solar installations will participate in the regular ground-based solar PV tenders under the EEG 2023 (see recital (74) above).

(123) The bid cap amounts to 7.5 ct/kWh with an annual decrease of 1%. The remuneration is to be paid to the beneficiary as a sliding market premium on top of the market price ([33]). In contrast to the general provisions in the EEG regarding support at times of negative electricity market prices (see recital (26)), innovative installations are not remunerated in the case of a negative market prices and this as of the first hour that the spot market price becomes negative. The BNetzA may adjust the bid caps by a maximum of 25% if the preceding three tender rounds have demonstrated that the bid caps used were too high or too low (§85a (1) of the EEG 2023). In practice, the BNetzA will analyse the results of the previous tenders, the price development in terms of raw materials, as well as specific investment and technology costs. The only change vis-à-vis the existing competence to adjust the bid cap in the EEG 2021 is that the maximum adjustment range has been changed to 25% in view of exceptionally high inflation rates experienced recently.

(124) If the tender is undersubscribed, the EEG 2021 foresaw that only the lowest 80% of bids in terms of capacity were to be awarded. Since innovation tenders grant support to new projects only, the risk of downward spiralling exists in case the 80% rule continues to be applied. To avoid this risk, despite the fact that innovation tenders have so far almost always been oversubscribed, the EEG 2023 envisages another volume control mechanism as of 2023, which works similarly as the volume control mechanism which was envisaged in the third round of solar PV tenders in the decision in case SA.102303, and similar to the volume control mechanism introduced in the case of regular ground-based solar PV tenders (see recital (76)(b)). As a consequence, if two tender rounds have been undersubscribed, the tender volume of the subsequent tender is limited to the average volume awarded in the previous two rounds; in case an upward market trend is observed, an additional 'trend' volume, equal to the difference between the awarded volumes in the previous two rounds, is added, in order to avoid that positive market developments are penalised by the volume control mechanism.

(125) Germany argues that these innovative projects are by definition more expensive than regular solar PV projects, since they require a combination with an electricity storage facility, which means they regularly incur significant additional investment costs in storage facilities. Germany submits that, although the tender is technology neutral, so far mainly large ground-based solar PV installations with battery storage are currently awarded support through the innovation tenders.

([33]) Instead of a fixed market premium as was initially envisaged in the EEG 2021. After the evaluation of the innovation tenders by Germany, Germany decided to change from a fixed to a sliding market premium in order to avoid overcompensation (see the decision in case SA.102303 for more details).

Germany submits that self-consumption is not realistic, since these are free-field installations, located at a significant distance from consumers.

(126) As a consequence, as reference project for the funding gap calculations, Germany provided data on the costs and revenues of a solar PV installation (with capacity of 7 MW and energy yield of 6 650 MWh) with battery storage (2.4 MWh), over its economic lifetime of 20 years. The size of the installation is based on the average size of innovative projects in the last innovation tender of 2022. The funding gap has been calculated according to the same methodology as described in section 2.3.3, and is presented in Table 9, together with the characteristics of the reference installation.

Table 9: Funding gap analysis – reference project innovation tender (no EEG)

Reference project	**Solar PV installation with battery storage**
Capacity (kW)	7 000
Lifetime of the project (y)	20
Energy yield (kWh/kW/y)	950
Investment cost (capex): **- Solar PV installation (EUR/kW)** **- Battery (EUR/kWh)**	 650 300
Operating cost (opex): **- Solar PV installation (EUR/kW/y)** **- Battery**	 12 1.5% of battery capex
Share of self-supply	0%
Funding gap (EUR)	**-1 827 500**

Source: Notification documents of the German authorities

(127) According to Germany, Table 9 shows that the funding gap of the reference project turns out to be significantly negative without EEG support. As a consequence, still according to Germany, without EEG support, the typical innovative installation is not profitable over the economic lifetime. Germany also claims that the underlying data it provided show that the notified measures cover primarily the initial fixed investment costs. The operating costs over the lifetime of the investment represent only 19% of the total cost of the relevant reference project.

(128) To make sure that the innovation projects are implemented, a guarantee needs to be provided by the beneficiary to the State, which amounts to 60 EUR/kW and the installations have to enter into operation at the latest 30 months after the award.

2.5. Description of non-tendered aid per technology

(129) For certain installations Germany plans to continue providing support based on feed-in tariffs or premiums through reference values set by law, as they are small in size (< 1 MW), demonstration projects and/or there are not enough projects

expected for those technologies that would allow the organization of a competitive tender. For all non-tendered technologies in the EEG 2023, Germany has increased the threshold for tendered aid from 750 kW to 1 MW.

(130) Similar as in the EEG 2021, the EEG 2023 establishes reference values for these installations, differentiated per technology and often also per capacity of the installation.

(131) Germany has provided funding gap calculations for each of the non-tendered technologies, both for the situation without support to demonstrate the need and incentive effect of the aid as well as for the situation with support to demonstrate that the feed-in tariff or reference value set by the law do not lead to overcompensation.

(132) For investments in new installations, in order to make sure that the subsidised projects are effectively implemented, remuneration is only paid once an installation has been commissioned and started operating. Installations are eligible for support if they fulfil the conditions under the EEG. The support is thus directly granted through the law itself, once a new installation fulfilling all legal requirements is connected to the grid and put into operation.

2.5.1. Onshore wind

(133) Onshore wind installations below 1 MW, pilot installations ([34]) and renewable energy community onshore wind projects up to 18 MW, are eligible for a feed-in tariff (< 100 kW) or a market premium (> 100 kW) with reference values set out in the EEG 2023, based on the average of the highest awarded bids of the tenders for onshore wind installations in the previous year and scaled in accordance with the reference yield model (see recital (57)). The segment of onshore wind installations below 1 MW is negligible in Germany.

(134) For very small onshore wind installations up to 50 kW, the EEG 2023 maintains the existing rule that they are classified as being located in the lowest wind quality site in the reference yield model. As explained in recital (60), Germany submits that the currently applied correction factor for sites with wind quality of 60% has been too low, so that the development of these sites has lagged behind. This also triggered the introduction of a new category of sites with 50% wind quality. Since the EEG 2023 introduced a new wind quality of 50%, the reference point for very small onshore wind installations has changed accordingly (§46(3) EEG). As a consequence, the correction factor and thus the entitlement to remuneration has increased (at least in relative terms, since the remuneration also depends on the tender results of the previous year). While the 50% correction factor only applies to the South region in the case of tendered onshore wind (see recital (59)(b)), the 50% correction factor applies to non-tendered onshore wind installations in the whole of Germany. For larger installations above 50kW, the wind quality is not assumed to be 50% but is determined by means of a site-by-site detailed assessment, which is not deemed proportionate in the case of micro-installations.

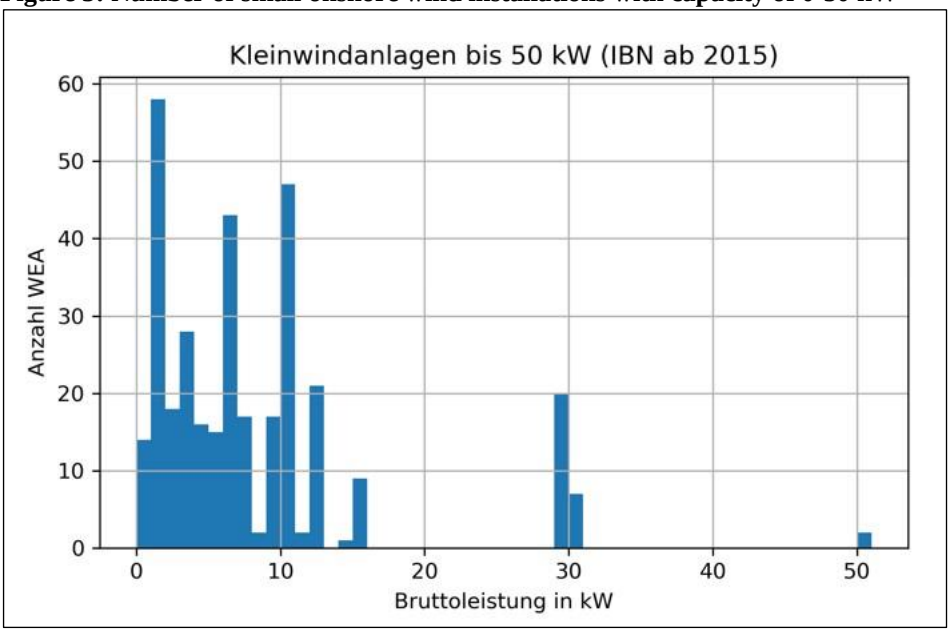
([34]) Germany explained that these types of pilot installations qualify for support as demonstration projects in line with points 96(b) and 107(a) of the CEEAG, such support not being distortive of competition.

(135) On top of the change in correction factor for micro-installations, the EEG 2023 abolishes the threshold of 6 MW for pilot installations, since pilot installations' capacity has tended to increase in recent years.

(136) Germany has provided as reference project a micro-installation of 6 kW, with an average energy yield of 8 MWh per year, representative for a typical small onshore wind installation operated by a small business or private owner.

(137) Germany submits that analysis of the BNetzA's database ('Marktstammdatenregister', 'MaStR')) ([35]) shows that the 6 kW project is representative of small onshore wind turbines in the order of 0-50 kW. The analysis also shows that only very few installations in the range 0 to 50 kW have been commissioned during the period 2015-2022, and that the expansion is concentrated in the range between 0 and 6 kW (see Figure 3).

Figure 3: Number of small onshore wind installations with capacity of 0-50 kW



Source: Analysis of the German authorities, based on MaStR data

(138) Further analysis of the MaStR over the period 2015-2022 shows, according to Germany, that in the segment 50-1000 kW, the vast majority of installations were Enercon installations of 800 kW, which are in the meantime withdrawn from the market; in 2021 and 2022 only one onshore wind installation of 800 kW became operational. Germany submits that there are currently no producers selling installations of this size on the German market. Therefore, Germany argues that this plant size will play a very minor role in future onshore wind turbine construction.

(139) Germany has submitted a quantification of all the costs and revenues over the lifetime of the installations (20 years), for the reference project of 6 kW. The

([35]) Available at: https://www.marktstammdatenregister.de/MaStR.

assumptions on which the funding gap calculations are based, shown in Table 10, are based on research by Jüttemann and Patrick (2022) ([36]).

Table 10: Funding gap analysis - Reference projects onshore wind < 1MW (without EEG)

Reference project	Small onshore wind installation (0-50kW)
Capacity (kW)	6
Lifetime of the project (y)	20
Energy yield (MWh/y)	8 000
Investment cost (EUR/kW)	4 400
Operating costs (EUR/kW/y)	58
Share of self-supply	75%
Funding gap (EUR)	**-9 998**

Source: Notification documents of the German authorities

(140) According to Germany, Table 10 shows that the funding gap of the reference project turns out to be significantly negative without EEG support. As a consequence, still according to Germany, without EEG support, the typical small onshore wind installation of 6 kW is not profitable over its economic lifetime. Still according to Germany, the underlying data provided by it show that primarily the initial fixed investment costs are covered by the aid. The operating costs over the lifetime of the investment represent only 14% of the total cost of the relevant small onshore wind reference project.

(141) The result of the funding gap calculation for the relevant reference project with EEG support (with NPV of the counterfactual scenario of zero) is presented in Table 11. The WACC applied in the case with EEG support is lower than the WACC in the case of no support, reflecting the higher risk of these projects. For small onshore wind installations, a WACC of 4.65% is used (based on a 70-30% debt and equity financing, 5% equity yield rate and cost of debt of 4.5%).

Table 11: Funding gap analysis - Reference projects onshore wind < 1MW (with EEG)

NPV reference projects (with EEG support)	6 kW
Funding gap (EUR)	-5 765

Source: Notification documents of the German authorities

(142) Germany indicates that, comparing the funding gap results in Table 10 and Table 11, it follows that, thanks to the EEG support, the funding gap is reduced by 42%. According to Germany, from a purely economic and monetary point of view, even with EEG support, the investment in small onshore wind installations remains unprofitable. However, Germany submitted that these funding gap calculations do not capture the fact that there are additional non-monetary motivations for investment, which might pay off in the longer term in terms of

([36]) Jüttemann and Patrick (2022), Small-wind market report - the best mopeds in Germany, edition 2022, version 7.0.

generating additional revenues. This applies in particular to small-scale onshore wind power plants on private land or in commercial areas. Plant operators increasingly need to make their own contribution to the energy transition, in particular as a marketing tool towards their customers. Germany argues that investments in small onshore wind turbines might help to make very clear to customers that the site produces environmentally-friendly products (*e.g.* small wind energy installations on roofs are widely visible). In addition, Germany submits that in this category of RES installations, new types of installations are constantly developed. With these provisions, clear framework conditions for the support of such installations are established, which helps facilitate the deployment of small testing installations as well as research and pilot installations. In particular, with the application of the 50% site quality factor the preparation of time-consuming and cost-intensive expert reports becomes unnecessary. It also has to be considered that businesses most often want to test such newly developed installations in proximity to their production or retail sites, whereas such projects often are aiming at future target markets which might regularly be located outside of Germany. These kinds of projects, mainly pursued for research and demonstration purposes, generally require significantly lower standards with regard to their individual economic viability.

2.5.2. Ground-based solar PV

(143) Ground-based solar PV installations below 1 MW are eligible for a feed-in tariff (< 100 kW) or a market premium (> 100 kW) with reference values set out in the EEG 2023. There is only one EEG reference value of 7 ct/kWh for all ground-based solar PV installations up to 1 MW. Similar as for the tendered ground-based solar PV, additional measures have been taken to extend the available surface areas on which ground-based solar PV installations can be built (see recital (76)).

(144) The degressivity of the support has been simplified in the EEG 2023: instead of the monthly adjustment system (see recital 142 the decision in case SA.57779), a half-yearly degressivity of 1% of the reference value applies as of 2024.

(145) The new category of "garden-PV" is a novelty in the EEG 2023, allowing households that cannot install a small solar PV installations on a roof, to install a small solar PV installation (up to 20 kW) in the garden. These systems receive a feed-in tariff of 7 ct/kWh. As reference project in this new category, a typical one- or two-family house system with an average size of 10 kW was chosen. Since households will primarily self-consume, the option of full feed-in of the electricity generated into the grid is not relevant here.

(146) For the typical ground-based solar PV installation, an installation of 1 MW was chosen as reference project. These installations are typically operated by small operators such as small companies, individual farmers or energy cooperatives, and are not built close to points of consumption, so that they feed in all electricity produced into the grid. Germany submits that the 1 MW installation is the most relevant project to assess the funding gap, since, first, unlike the case of small rooftop solar PV projects, there is no differentiation in the EEG support according to size (see recital (143)), and second, since smaller installations are more expensive, their funding gap will be even more negative.

(147) Germany has submitted a quantification of all the costs and revenues over the lifetime of the installations (20 years), for each of the reference projects. The assumptions on which the funding gap calculations are based, shown in Table 12. The energy yield (kWh/kW) is decreasing by 0.25% per year, to take into account the decrease in performance of PV panels over time.

Table 12: Funding gap analysis - Reference projects ground-based solar PV<1MW (without EEG)

Reference project	**Garden-PV**	**Other small ground-based PV**
Capacity (kW)	10	1 000
Lifetime of the project (y)	20	20
Energy yield per year (kWh/kW)	930	950
Investment cost (EUR/kW)	1 300	760
Operating costs (EUR/kW/y)	17	15
Share of self-supply	25%	0%
Funding gap (EUR)	**-3 805**	**-250 141**

Source: Notification documents of the German authorities

(148) According to Germany, Table 12 shows that the funding gap of the reference projects turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical garden-PV and small ground-based solar PV installations are not profitable over their economic lifetime. Still according to Germany, the underlying data provided by it show that the support covers primarily the initial fixed investment costs. The operating costs over the lifetime of the investment represent only 21% of the total cost of both ground-based solar PV reference projects.

(149) The results of the funding gap calculations for the relevant reference projects with EEG support (with each time a NPV of the counterfactual scenario of zero) are presented in Table 11.

(150) The WACC applied in the case with EEG support is lower than the WACC in the case of no support, reflecting the higher risk of these projects. For small ground-based solar PV installations, a WACC of 4.65% is used (based on a 70-30% debt and equity financing, 5% equity yield rate and cost of debt of 4.5%).

Table 13: Funding gap analysis - Reference projects ground-based solar PV< 1MW (EEG)

NPV reference projects (with EEG support)	**Garden-PV (10 kW)**	**Other ground-based PV (1 MW)**
Funding gap (EUR)	-200	-52 774

Source: Notification documents of the German authorities

(151) According to Germany, comparing the funding gap results in Table 12 and Table 13, it follows that, thanks to the EEG support, the funding gap is significantly reduced, by 95% and 80% for garden-PV and other ground-based PV installations respectively. The funding gap of the typical garden-PV project is almost reduced

to zero. With respect to other small ground-based solar PV installations, from a purely economic point of view, the funding gap remains significantly negative despite the EEG support. Therefore, it is not clear that this type of projects would be undertaken. Again, these funding gap calculations do not capture the fact that there are additional motivations for investment. Germany submits that similar motivations as for small onshore wind projects are also present for medium-size PV installations of 1 MW: commercial and industrial companies have an interest in actively participating in the energy transition and there may be obligations to customers to demonstrate climate-friendly products. In addition, as a result of the investment, operators generally also expect to obtain an indirect economic advantage by enabling them to compete effectively against competitors through lower energy costs.

2.5.3. Rooftop solar PV

(152) Small rooftop PV installations up to 1 MW are exempt from the competitive bidding requirement and are instead eligible for a feed-in tariff (< 100 kW) or a market premium (> 100 kW) with reference values set out in the EEG 2023.

(153) As explained in the decision in case SA.102303 Germany introduced in the course of 2022 (as part of the EEG 2021) a differentiation between full feed-in installations and partial self-supply installations in order to fully optimise the available space on roofs and to incentivise small rooftop solar PV installations to not only produce electricity for own consumption but also for feed-in into the grid (see recital 9 of the decision in case SA.102303). This system has been kept in the EEG 2023 with only limited adjustments in the category sizes (see Table 14). As in the case of ground-based solar PV, the degressivity rule has been simplified in the EEG 2023 (see recital (144)).

(154) The following levels of support are to be made available in the EEG 2023:

Table 14: Overview of small rooftop PV support levels in the EEG 2023

Size of rooftop PV installation	Level of support	Form of support
Full feed-in		
Up to 10 kW	13.40 ct/kWh	Feed-in tariff
Up to 100 kW	11.30 ct/kWh	Feed-in tariff
Up to 400 kW	9.40 ct/kWh	Market premium
Up to 1 MW	8.10 ct/kWh	Market premium
Partial self-supply		
Up to 10 kW	8.60 ct/kWh	Feed-in tariff
Up to 40 kW	7.50 ct/kWh	Feed-in tariff
Up to 1 MW	6.20 ct/kWh	Market premium

Source: Notification documents of the German authorities

(155) Hence, under the new arrangement in the EEG 2021, if the operator feeds into the grid all of the electricity produced by the installation in a calendar year, the existing remuneration is increased compared to the existing aid level:

(a) by 4.80 ct/kWh for installations of up to 10 kW;

(b) by 3.80 ct/kWh for installations of up to 40 kW;

(c) by 5.10 ct/kWh for installations of up to 100 kW;

(d) by 3.20 ct/kWh for installations of up to 400 kW; and

(e) by 1.90 ct/kWh for installations up to 1MW.

(156) The support will be calculated for each installation individually, and will be applied pro rata with respect to the size of the installation (see recital 41 of the decision in case SA.102303).

(157) Germany has provided the following reference projects for the measure, based on the different installation sizes for which distinct levels of support apply in the EEG 2021, in particular in the new full feed-in segment with 100% grid injection. Germany considers that these projects are representative of the different types of small rooftop PV installations. There are four reference projects related to size:

(a) Rooftop solar PV installation of 10 kW, with an average energy yield of 9.3 MWh per year; representative for a typical rooftop solar PV system on a single household residential building;

(b) Rooftop solar PV installation of 100 kW, with an average energy yield of 90 MWh per year; representative for a typical rooftop solar PV system on a commercial building;

(c) Rooftop solar PV installation of 400 kW, with an average energy yield of 360 MWh per year; representative for a typical rooftop solar PV system on a large commercial or industrial building, representative for the largest category of installations that are supported in the partial self-supply segment ([37]);

(d) Rooftop solar PV installation of 1 MW, with an average energy yield of 900 MWh per year; representative for the largest possible rooftop solar PV installation that can be supported without tender.

(158) The analysis is similar as the one executed in the context of the decision in case SA.102303, and has been replicated for each of the four installation sizes and also per aid category, to distinguish between the support levels in the full feed-in segment and the existing segment, which allows for partial self-supply. According to data submitted by Germany, a small installation has a rate of self-supply of typically 25%; hence, this degree of self-supply has been used in the following analysis.

(159) The same installation sizes have been used for both segments of support, despite the different size categories in the segment with partial self-supply. These reference projects represent typical average installations and are provided by way of sample. The level of support for reference projects in the partial self-supply segment were calculated on the basis of the level of support applicable to installations of that size. The level of support is granted pro rata and is calculated individually for each installation.

(160) Germany has submitted a quantification of all the costs and revenues over the lifetime of the installations (20 years), for each of the eight reference projects (per size and per type of support), presented in Table 15.

([37]) Germany argues that in the segment of small rooftop PV installations, larger installations above 400 kW are in practice rarely built. The reasoning is that in order to be profitable a large share of self-consumption is required, which is generally not achievable for these installations. According to Germany's assessment and experience with the market, only 10% of the plants, which are larger than 400 kW, use part of the electricity they consume.

Table 15: Funding gap analysis - Reference projects rooftop solar PV<1MW (no EEG)

Reference project	Small rooftop PV < 10kW	Small rooftop PV < 100kW	Small rooftop PV < 400 kW	Small rooftop PV < 1 MW
Capacity (kW)	10	100	400	1 000
Lifetime of the project (y)	20	20	20	20
Energy yield per year (kWh/kW)	930	900	900	900
Investment cost (EUR/kW)	1 460	1 055	910	850
Operating costs (EUR/kW/y)	17	17	17	15
Full Feed-in				
Funding gap (EUR)	**-10 633**	**-59 716**	**-172 920**	**-377 482**
Partial Self-supply (25%)				
Funding gap (EUR)	**-5 405**	**-19 886**	**-83 028**	**Not relevant**

Source: Notification documents of the German authorities

(161) The energy yield (kWh/kW) is somewhat higher for the smallest size of installations, since small rooftop installations are usually installed on residential buildings with pitched roofs, which is more favourable for the energy yield compared to flat roofs, and decreasing by 0.25% per year, to take into account the decrease in performance of PV panels over time.

(162) According to Germany, Table 15 shows that the funding gap of the reference projects turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical small rooftop solar PV installations are not profitable over their economic lifetime. Still according to Germany, the data provided by it show that the notified measures cover primarily the initial fixed investment costs. The operating costs over the lifetime of the investment are also covered but represent 15 to 25% of the total costs of the relevant reference projects.

(163) The results of the funding gap calculations for the eight relevant reference projects with EEG support (with each time a NPV of the counterfactual scenario of zero) are presented in Table 16. The same methodology is used as for the case without EEG support, but a different WACC is used (to take into account the lower risk of EEG supported projects). For installations up to 10 kW a WACC of 3.9% is used (based on a 50-50% debt and equity financing, 5% equity yield rate and cost of debt of 2.8%), while for larger installations a WACC of 4.1% was used (based on a 75-25% debt and equity financing, 8% equity yield rate and cost of debt of 2.8%).

Table 16: Funding gap analysis - Reference projects ground-based solar PV<1MW (EEG)

NPV reference projects (with EEG support)	10 kW	100 kW	400 kW	1 MW
Full feed-in	-1 121	-620	-278	-33 508
Partial feed-in	-301	-208	-220	Not relevant

Source: Notification documents of the German authorities

(164) According to Germany, comparing the funding gap results in Table 15 and Table 16, it follows that, thanks to the EEG support, the funding gap is significantly reduced (reductions between 89% and 99%). The funding gaps of the installations up to 400 kW are almost reduced to zero. With respect to the largest possible non-tendered rooftop solar PV installations, as in the case of ground-based solar PV installations of 1 MW, from a purely economic point of view, the funding gap remains significantly negative despite the EEG support. Nevertheless, similar as for ground-based solar PV installations of 1 MW, there are additional motivations for the investment (see recital (151)).

2.5.4. Biomass and biogas (Güllekleinanlagen)

(165) Small biogas installations up to 150 kW using manure for the production of electricity ('*Güllekleinanlagen*') are exempt from the competitive bidding requirement and are instead eligible for a feed-in tariff (< 100 kW) or a market premium (> 100 kW) with reference values set out in the EEG 2023.

(166) Only those small manure installations that meet the following additional eligibility requirements can benefit from the support:

(a) the electricity must be generated at the location of the biogas generation plant;

(b) the electricity is generated from biogas obtained through anaerobic fermentation of biomass within the meaning of the Biomass Ordinance (*Verordnung über die Erzeugung von Strom aus Biomasse*, '*Biomasseverodnung*');

(c) on average in any calendar year, manure (other than poultry manure and dry poultry manure) must represent at least 80% by mass of the biomass used in the production of biogas; perennial clover may be counted against this share to a maximum of 10% by mass.

(167) There are further rules on calculation of the required share of manure referred to in recital (166)(c) in situation where this share could not have been met due to the ban of §6(1)(18) of the Animal Health Act (*Gesetz zur Vorbeugung vor und Bekämpfung von Tierseuchen*, '*Tiergesundheitsgesetz*').

(168) Unlike under the EEG 2021, the small manure installations are not entitled to flexibility payments.

(169) Compared to the EEG 2021, where the reference value was set at 22.23 ct/kWh for all small manure installations, under the EEG 2023 the reference value depends on the size of the installation and will be applied pro rata with respect to the size of the installation. The reference value is set at:

(a) 22 ct/kWh for a rated capacity up to and including 75 kW; and

(b) 19 ct/kWh for a rated capacity above 75 kW and up to and including 150 kW.

(170) Similar to the EEG 2021, the reference values are subject to a yearly degressivity of 0.5% per year. As for the other technologies, degressivity is temporarily suspended and will resume from 1 July 2024.

(171) Germany has provided the following two reference projects for the measure, based on the different installation sizes for which distinct levels of support apply in the EEG 2023:

(a) Small manure installation of 75 kW, with an average energy yield of 615 MWh per year;

(b) Small manure installation of 150 kW, with an average energy yield of 1 222 MWh per year.

(172) Germany has submitted a quantification of all the costs and revenues over the lifetime of the installations (20 years), for each of the two reference projects, presented in Table 17. The quantified costs include feedstock transport costs. Although in both reference projects the installations use 80% of manure (as required by the EEG 2023) and 20% of solid dung, the transport costs are calculated only for 50% of the used quantity (in the case of 75 kW installations) and 80% of the used quantity (in the case of 150 kW installations).

(173) The WACC applied in the case with no EEG support is higher than the WACC in the case of State support, reflecting the higher risk of these projects. For small manure installations without EEG support a WACC of 7% is used.

Table 17: Funding gap analysis – reference projects small manure <150kW (no EEG)

Reference project	**Small manure < 75kW**	**Small manure < 150kW**
Capacity (kW(el))	75	150
Lifetime of the project (y)	20	20
Energy yield per year (kWh/kW(el))	8 200	8 200
Investment cost (EUR/kW)	8 549	6 598
Operating costs (EUR/kW/y)	583	692
Funding gap (EUR)	**-1 595 400**	**-1 836 900**

Source: Notification documents of the German authorities

(174) According to Germany, Table 17 shows that the funding gap of the reference project turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical small manure installations of 75 kW and 150 kW are not profitable over their economic lifetime. Still according to Germany, the underlying data provided by it show that primarily the operating

costs are covered by the aid, amounting to 51% in the case of a 75 kW installation and amounting to 66% in the case of a 150 kW installation. Germany submits that this results in a more environmentally-friendly operating decisions, because otherwise such installations would not operate or would use natural gas.

(175) The results of the funding gap calculations for the two relevant reference projects with EEG support (with each time a NPV of the counterfactual scenario of zero) are presented in Table 18. The same methodology is used as for the case without EEG support, but a different WACC is used (to take into account the lower risk of EEG supported projects). For small manure installations with EEG support a WACC of 2.4% is used (based on an 80-20% debt and equity financing, 4% equity yield rate and cost of debt of 2%).

(176) As part of the crisis measures to increase the electricity production from other sources than gas (see recital (8)), Germany has made the rules for some existing small manure installations more flexible. The installations that were put into operation before 1 January 2012 can benefit from the support if, on average in any calendar year, manure represents at least 30% by mass of the biomass used in the operation. If, however, this minimum share of manure is not met, the installations will lose the eligibility to this bonus also for the future. For the year 2023, in view of the Russian war of aggression against Ukraine and the need to save on gas and have as much as possible renewables in the system, if the minimum share of manure is not met, the support will still be granted once the minimum share is met again (only for the days on which this minimum share has not been met, no bonus will be granted).

Table 18: Funding gap analysis – reference projects small manure <150kW (EEG)

NPV reference projects (with EEG support)	**75 kW**	**150 kW**
Funding gap (EUR)	-13 300	-236 100

Source: Notification documents of the German authorities

(177) According to Germany, comparing the funding gap results in Table 17 and Table 18, it follows that, thanks to the EEG support, the funding gap is significantly reduced, by 99% and 87% for 75 kW and 150 kW plants respectively. Nevertheless, similar as for small solar PV and onshore wind installations, there are additional motivations for the investment (see recital (151)).

2.5.5. Solar PV tenant electricity (Mieterstrom)

(178) Similar as in previous versions of the EEG, the EEG 2023 keeps the separate system for support to 'tenant electricity' or 'Mieterstrom' (see section 2.6.2.6. in the decision in case SA.57779), which aims at encouraging the direct consumption of electricity from solar PV installations by tenants in multi-apartment buildings or equivalent housing complexes in order to make the use of the roof surfaces of these buildings more attractive.

(179) As explained in recital 146 of the decision in case SA.57779, the measure aims at supporting landlords willing to install solar panels on the roof of the building that they rent out fully or partially, hereby promoting the consumption of PV electricity directly within the building in situations where property is rented and the electricity therefore not consumed by the owner of the building/PV

installation. The landlord invests in the PV installation and makes its production available to its tenants. The tenant electricity is to be supplied to tenants under a tenant electricity contract in accordance with Section 42a of the Energy Industry Act (*Energiewirtschaftsgesetz, 'EnWG'*). The tenant electricity contract must also provide for the supply of electricity during periods when there is no or insufficient supply of electricity from the solar PV installation. The price of the tenant electricity and the electricity supplied during periods when there is no or insufficient supply of tenant electricity must not exceed 90% of the base tariff in force in the respective network area.

(180) The level of support for solar tenant electricity has essentially not changed in the EEG 2023 compared to the EEG 2021. As of 1 January 2023, the reference values in ct/kWh are set at 2.67, 2.48 and 1.67 for installations of up to 10 kW, 40 kW and 1 MW respectively, and will be adjusted based on the already existing degressivity rules and published by the BNetzA on their website. Mieterstrom installations receive the tenant electricity support for electricity consumed in the building by participating tenants. Excess electricity that is fed into the grid receives the same remuneration as regular small rooftop solar PV installations that self-consume. Provisions limiting support to 500 MW of newly installed capacity per year (and reducing this limit in subsequent years after it is reached) have been abandoned.

(181) Germany submits that without the support, landlords would not have an incentive to invest in solar PV infrastructure in order to offer solar PV electricity to their tenants, and provided funding gap calculations for different scenarios to demonstrate this. The profitability assessment takes into account the following costs: investment cost (capex), the connexion cost to the electrical installation of the building, the costs of additional metering equipment, the costs of managing the electricity contract with the tenant and the costs of supplying electricity from the grid to cover the part of the consumption not covered by the solar installation. The following revenues are considered: the income obtained by the landlord from the supply of solar PV electricity to tenant(s) and the income obtained from injecting any remaining unused electricity into the grid. The revenues depend on the number of tenants entering into a solar tenant electricity contract with the landlord and on the price per kWh agreed between the landlord and the individual tenants.

(182) Germany submitted funding gap calculations depending on the size of the installation (20 kW, 100 kW or 400 kW; representing buildings with respectively 6, 30 or 120 residential units) and depending on the participation rate of the tenants (50%, 70% or 90%). This results in nine reference situations. In all nine reference situations, the following is assumed: an energy yield of 900 full-load hours, 0.25% annual degradation of installations and an annual electricity consumption per residential unit of 2 500 kWh. In all situations electricity for self-consumption is assumed to be one third of all electricity generated. Apart from the investment and operating costs related to typical solar PV installations of that size, additional investment costs of EUR 180 per participating rental unit and additional annual operating costs of EUR 120 per participating rental unit are assumed as additional costs related to solar tenant electricity.

(183) For the marketing of excess electricity (not consumed within the building) from installations up to 100 kW, the feed-in tariffs for small rooftop solar PV

installations in the EEG 2023 were used. For the 400 kW reference installation, the sliding market premium model is applied in the calculations. The WACC used in the funding gap calculations amounts to 7%, which is higher than the WACC used in the funding gap calculations for regular rooftop solar PV installations. This is due to the fact that the landlord using tenant electricity contracts acts as a supplier of electricity and faces significant additional risk (payment defaults, replacement of tenants, higher administrative burden, additional metering costs, costs for acquiring tenants and convincing them to participate in the tenant electricity scheme (which is always voluntary), etc.), increasing the cost of financing.

(184) Germany has submitted a quantification of all the costs and revenues over the lifetime of the installations (20 years), as well as the funding gap for each of the nine reference situations, presented in Table 19. The nine counterfactual situations represent the cases in which the landlord receives merely the regular EEG support for small solar PV installations but not the bonus for solar tenant electricity.

Table 19: Funding gap analysis – reference projects tenant electricity support (no EEG)

Reference project:	**6 residential units**			**30 residential units**			**120 residential units**		
Capacity (kW)	20			100			400		
Lifetime of the project (y)	20			20			20		
Energy yield per year (kWh/kW)	900			900			900		
Investment cost PV (EUR/kW)	1 370			1 110			955		
Operating costs PV(EUR/kW/y)	17			17			19		
Participation rate	**50%**	**70%**	**90%**	**50%**	**70%**	**90%**	**50%**	**70%**	**90%**
Additional capex tenant electricity (EUR/kW)	27	38	49	27	38	49	27	38	49
Additional opex tenant electricity (EUR/kW)	18	25.2	32.4	18	25.2	32.4	18	25.2	32.4
Funding gap (EUR)	**-8 900 to -12 200**			**-25 900 to -42 600**			**-24 700 to -91 400**		

Source: Notification documents of the German authorities

(185) According to Germany, Table 19 shows that the funding gap of the reference projects turns out to be significantly negative without the EEG bonus for tenant electricity. As a consequence, without EEG support, landlords would not find it interesting to offer tenant electricity contract. Still according to Germany, the data provided by it show that the notified measures cover primarily the initial fixed investment costs. The operating costs over the lifetime of the investment represent less than 50% of the total costs for the majority of the nine relevant reference

situations. In case the participation rate is high, the additional operating costs become more important and the share of operating costs in the total costs exceeds 50%. The reason is that the high administrative costs for metering, additional expenses for individual billing, acquiring customers and organising the final electricity product increase with the number of participants.

(186) Germany submitted funding gap calculations for the nine relevant reference situations including the EEG bonus for tenant electricity, presented in Table 20.

Table 20: Funding gap analysis - Reference projects tenant electricity support (with EEG)

Reference project:	**6 residential units**			**30 residential units**			**120 residential units**		
Participation rate	**50%**	**70%**	**90%**	**50%**	**70%**	**90%**	**50%**	**70%**	**90%**
Funding gap (EUR)	**-7 500 to -10 800**			**-20 600 to -37 300**			**-1 800 to -68 500**		

Source: Notification documents of the German authorities

(187) According to Germany, comparing the funding gap results in Table 19 and Table 20, it follows that, the EEG bonus for solar tenant electricity, reduces the funding gap (between 10 and 93% depending on the specific configuration) and makes the investment more attractive for certain residential configurations. As in the case of small solar PV installations below 1 MW, from a purely economic point of view, the funding gap remains negative despite the EEG support and the EEG bonus for solar tenant electricity. Nevertheless, similar as for other small solar PV installations, there are additional motivations for the investment, in this case enabling landlords to offer climate-friendly energy solutions to their tenants, which makes the apartment offer more attractive for certain tenants. In the medium to long run, this will generate additional revenues for landlords, which cannot be captured by the costs and revenues in the current model. In addition, and what the model cannot take into consideration, the funding gap will decrease further when additional participating tenants do not further increase the direct consumption share that can be taken into account in the total meter model. This is consistently the case for the reference installations under consideration. In summary, although Germany acknowledges that the tenant electricity support does not pay off for all configurations of residences, for a significant share of landlords, it will still trigger the step to investing in solar PV, which makes that the support provides an incentive effect for certain landlords. Germany also submits that landlords, who want to implement the tenant electricity model are usually very highly motivated; this relates to tenant loyalty (*e.g.* in the case of housing cooperatives) or a special commitment to climate protection (smaller owner associations or particularly committed social investor groups). Moreover, projects may be used for public relations to underline innovative strength. Therefore, even if a (smaller or bigger, depending on the precise configuration) financing gap remains, the additional support - in conjunction with the mentioned motivations outside the support scheme itself - generally provide a sufficient incentive effect.

2.5.6. Hydropower

(188) Support to hydropower installations has not been amended in the EEG 2023. As was the case under the EEG 2021, support is granted to new installations as well as to existing installations when they extend their capacity. For existing

installations with installed capacity of more than 5 MW, the support is limited to the capacity extension.

(189) Hydropower installations require corresponding authorisations under the Water Management Act ('*Wasserhaushaltsgesetz*').

(190) As mentioned in recital 153 of the decision in case SA.57779, the potential for the installation of new hydropower installations or the modernisation of existing installations is extremely limited, but these installations are useful as a complement to intermittent RES sources. There is no reason to expect an increase in the number of hydropower installations in the next years; on the contrary, the installed capacity of hydropower installations and therefore the electricity generation decreases. Germany submits that this measure is therefore negligible and has little potential to distort competition or affect trade between Member States.

(191) The reference values decrease annually by 0.5% and, similar as for other technologies, the reference value is calculated individually for each installation pro rata of their actual capacity. The updated values as of 1 January 2023 amount to:

Capacity (MW)	**0.5**	**2**	**5**	**10**	**20**	**50**	**> 50**
Reference value (ct/kWh)	12.03	7.93	6.07	5.32	5.13	4.12	3.37

(192) Support to hydropower in the EEG is granted to both new plants and modernised plants. Germany provided a quantification of the following four relevant reference projects:

(a) A small modernised hydropower plant of 200 kW;

(b) A large modernised hydropower plant of 5 MW;

(c) A small new hydropower plant of 100 kW;

(d) A medium-size new hydropower plant of 500 kW.

(193) Germany has submitted a quantification of all the costs and revenues over 20 years, for each of the reference projects. The assumptions on which the funding gap calculations are based, are shown in Table 21.

Table 21: Funding gap analysis - Reference projects hydropower projects (without EEG)

Reference project	Small modernised hydropower plant	Large modernised hydropower plant	Small new hydropower plant	Medium-size new hydropower plant
Capacity (kW)	200	5 000	100	500
Lifetime of the project (y)	20	20	20	20
Energy yield per year (kWh/kW)	4 000	4 500	4 100	4 000
Investment cost (EUR/kW)	4 265	1 830	9 750	7 925
Operating costs (EUR/kW/y)	224	199	201	158
Share of self-supply	5%	1.5%	10%	3%
Funding gap (EUR)	**-757 400**	**-5 849 500**	**-720 200**	**-2 883 600**

Source: Notification documents of the German authorities

(194) According to Germany, Table 21 shows that the funding gap of the reference projects turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical hydropower installations are not profitable over their economic lifetime. Still according to Germany, the underlying data provided by it show that the support covers primarily the initial fixed investment costs in the case of new hydropower installations. The operating costs over the lifetime of the investment represent 29% of the total cost in each of the two reference projects concerning new installations. The operating costs over the lifetime of the investment represent 51% and 68% of the total cost for the small and large reference projects concerning modernised installations respectively.

(195) Germany submits that the investments in hydropower make a significant contribution to achieving the objectives of the Union Water Framework Directive ([38]), as well as reaching the renewables targets. Therefore, Germany considers that it is important that these installations remain in the market. When modernizing existing installations, the installations are made more environmentally-friendly (*e.g.* improved fish protection), and more technically performing (*e.g.* renewal of the turbines, improved system control, improved hydraulic engineering for optimized inflows). Certain investments in more environmentally-friendly measures lead to high operating costs: for instance, the maintenance of fish-friendly screens or the maintenance, monitoring and operation of new fish upstream and downstream systems can significantly increase the operating costs depending on the specific local requirements.

([38]) Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1).

(196) The results of the funding gap calculations for the relevant reference projects with EEG support (with each time a NPV of the counterfactual scenario of zero) are presented in Table 22.

(197) The WACC applied in the case with EEG support is lower than the WACC in the case of no support, reflecting the higher risk of these projects. For new hydropower installations, a WACC of 2.9% and 3.1% is used, for modernised installations, a WACC of 3% and 4.1% is used (based on more favourable banking conditions with EEG support and historical values of the last 15 years). The WACC increases as the system output increases. The reason for this is the investor structure. Small plants in the range of 100 and 200 kW are usually operated by small companies or private individuals. Large systems, on the other hand, are operated by municipal utilities and larger energy suppliers, who have higher expectations in terms of return on equity. This leads to the WACC increasing with the installed capacity.

Table 22: Funding gap analysis - Reference projects hydropower projects (with EEG)

NPV reference projects (with EEG support)	Small modernised hydropower plant	Large modernised hydropower plant	Small new hydropower plant	Medium-size new hydropower plant
Funding gap (EUR)	-300 400	-3 997 700	-345 700	-1 177 200

Source: Notification documents of the German authorities

(198) According to Germany, comparing the funding gap results in Table 21 and Table 22, it follows that, thanks to the EEG support, the funding gap is significantly reduced (by 32% in the case of large modernised plants and by more than 50% for the other three reference projects), without leading to overcompensation. From a purely economic point of view, the funding gap remains significantly negative despite the EEG support. Therefore, it is not clear that this type of projects would be undertaken. Again, these funding gap calculations do not capture the fact that there are additional motivations for investment.

(a) In the case of smaller hydropower plants, operators are typically engaged entrepreneurs, private individuals or local energy supply companies, which take into account non-financial elements in the economic analysis. The operation of small installations is also closely linked to local businesses. As a result, some attractive revenues can be obtained through the direct supply of electricity to certain local companies. In addition, smaller installations can reduce operating costs through own maintenance work and regular inspections of the installations. Finally, small installations and their water rights have been privately owned for decades. Water law is often linked to a specific plot of land. As a result, in the case of a replacement construction or modernisation within the meaning of the EEG, certain parts of the costs, such as land purchase or other forms of compensation for rights of way or line, or for renting, for example, business buildings, are eliminated.

(b) In the case of larger installations, there are few sites that are accessible in Germany from an environmental, technical and economic point of view. It is precisely from an environmental point of view that support for hydropower should be supported, especially for those sites which, because of external conditions, are relatively easily accessible and can be

implemented in pre-burdened sites. For example, there is an input load if a hydropower plant is to be transferred to an existing transverse structure in an artificial or heavily modified watercourse. The construction of a new hydropower plant with an existing cross-construction plant can drastically reduce the investment costs. Moreover, it is precisely in artificial or heavily modified watercourses that the ecological measures which are actually very costly can be implemented at a much lower cost. In individual cases, the ecological requirements for such power plant sites may also be much lower because, for example, the ecological continuum for fish does not have to be implemented at the power plant itself, but in a parallel natural water section. Finally, investment in larger hydropower plants is a long-term investment, which is considered low-risk and crisis-proof. In addition, hydropower plants of this magnitude have a much more uniform feed-in behaviour compared to wind energy and PV, and they can offer different network services at a much lower cost. Medium-sized and regional energy suppliers therefore have an interest in complementing their power plant mix with hydropower installations.

2.5.7. Geothermal energy

(199) Support to deep geothermal energy installations has not been amended in the EEG 2023. As was the case under the EEG 2021, the reference value currently amounts to EUR 25.2 ct/kWh, and will be decreased by 0.5% per year as of 2024. Once total installed capacity exceeds 120 MW for the first time, the annual degressivity will be increased to 2%.

(200) As mentioned in recital 137 of the decision in case SA.57779, the development of geothermal energy installations has not taken off. Germany explained that this is due to the high investment costs and the high project risks. There is currently one installation entering into operation every 2-3 years and the number of new projects will likely stay at this level in the coming years. The annual generation of electricity from geothermal energy installations amounts to 0.2 TWh, accounting for less than 0.1% of total renewable energy generation. Germany submits that this measure is therefore negligible and has little potential to distort competition or affect trade between Member States.

(201) In the absence of a market for geothermal installations, Germany submits that it is difficult to provide meaningful information on the cost structure of such projects, and that a meaningful funding gap calculation cannot be provided. Germany refers to the figures provided in recital 139 of the decision in case SA.57779. Germany submits that the LCOE of geothermal plants is currently still in the range of EUR 29-31 ct/kWh for existing plants and EUR 25-32 ct/kWh for new installations, which is generally higher than the EEG support of EUR 25.2 ct/kWh ([39]).

(202) As mentioned in recital (32), despite the current high electricity prices due to the Russian war of aggression against Ukraine, electricity price scenarios known to the German federal authorities do not suggest that the electricity prices will remain high in the long run. As a consequence, in the long run, the cost of

([39]) Basisdaten aus dem wissenschaftlichen Endbericht, II b): Geothermie, Juni 2019.

electricity generation from geothermal power is expected to be higher than the market price for electricity, so that the need for State aid cannot be excluded.

2.5.8. Sewage and landfill gas

(203) Support to sewage and landfill gas installations has not been amended in the EEG 2023. As was the case under the EEG 2021, the reference values are decreasing by 1.5% per year, and, similar as for other technologies, the reference value is calculated individually for each installation pro rata of their actual capacity. As of 1 January 2023 the updated values will amount to:

Capacity (MW)	**Landfill gas**		**Sewage gas**	
	0.5	**5**	**0.5**	**5**
Reference value (ct/kWh)	7.46	5.17	5.93	5.17

(204) Installations for the production of electricity from landfill and sewage gas require a permit under the Federal Emissions Control Act ('*BImSchG*').

(205) Similar as for hydropower and deep geothermal installations, Germany submits that the number of sewage and landfill installations and the electricity produced from them is stable or decreasing. The annual generation of electricity from sewage gas installations amounts to 1 TWh, accounting for only 0.4% of total renewable energy generation. Twice as much electricity is generated from the landfill gas installations. Germany submits that these measures are therefore negligible and have little potential to distort competition or affect trade between Member States.

(206) The following reference installations, reflecting the average capacity of existing installations and expected capacity of new installations to be built in the future, were chosen as relevant for landfill and sewage gas installations:

(a) A small new landfill gas plant of 500 kW;

(b) A small new sewage gas plant of 200 kW.

(207) Germany has submitted a quantification of all the costs and revenues over the lifetime of the installations (20 years), for each of the landfill and sewage gas reference projects. The assumptions on which the funding gap calculations are based, are shown in Table 23.

Table 23: Funding gap analysis - Reference projects landfill/sewage gas (without EEG)

Reference project	Landfill gas	Sewage gas
Capacity (kW)	500	200
Lifetime of the project (y)	20	20
Energy yield per year (kWh/kW)	5 500	7 000
Investment cost (EUR/kW)	1 541	1 803
Operating costs (EUR/kW/y)	185	297
Share of self-supply	20%	20%
Funding gap (EUR)	**-707 316**	**-401 600**

Source: Notification documents of the German authorities

(208) According to Germany, Table 23 shows that the funding gap of the reference projects turns out to be significantly negative without EEG support. As a consequence, without EEG support, the typical landfill and sewage gas installations are not profitable over their economic lifetime. The operating costs over the lifetime of the investment represent 61% and 68% of the total cost for the reference landfill and sewage gas installation respectively. While a high percentage of the support covers operating costs, Germany submits that supporting this type of projects is still useful from an environmental point of view, since, as explained below in recital (210), without support the gases would simply be flared.

(209) The results of the funding gap calculations for the relevant reference projects with EEG support (with each time a NPV of the counterfactual scenario of zero) are presented in Table 24. The WACC applied in the case with EEG support is only slightly lower than the WACC in the case of no support, since the amount of EEG support is relatively low, and the financing risk similar. Germany submits that the support is nevertheless needed to make the projects bankable.

Table 24: Funding gap analysis - Reference projects landfill/sewage gas projects (with EEG)

NPV reference projects (with EEG support)	Landfill gas	Sewage gas
Funding gap (EUR)	-698 500	-392 900

Source: Notification documents of the German authorities

(210) According to Germany, comparing the funding gap results in Table 23 and Table 24, it follows that the EEG support slightly reduces the funding gap and therefore slightly improves the profitability. From a purely economic point of view, the funding gap remains significantly negative despite the EEG support. Therefore, it is clear that these projects are not necessarily undertaken for purely economic reasons. However, landfill and sewage gas projects are usually undertaken by municipal utilities, which are motivated by other than financial objectives, namely, primarily climate protection, but also the detrimental effects to the utilities' image when they would not process the accruing gases but let them emit in the air or be flared. The EEG support is a decisive factor in securing financing

from banks and thus making projects possible in first place. In absence of this support, most projects would not be undertaken and the utilities would resort to alternatives, such as emitting or flaring the gases into the atmosphere instead of using them. Put otherwise, the key benefit of the EEG support in the case of landfill and sewage gas installations is to make these projects bankable and to allow for the behavioural change to invest in an electricity generation facility rather than simply emitting or flaring the accrued landfill or sewage gas in the air. The support thus sets the decisive incentive for the operators of landfills and waste water treatment plants to choose for a more environmentally-friendly way to treat these gases.

2.6. Duration of the support

(211) The notified measures apply between 1 January 2023 and 31 December 2026 (four years).

2.7. Cumulation

(212) Germany has confirmed that aid granted pursuant to the notified measures can only be cumulated with aid or *de minimis* aid to the extent that such cumulation is permissible under the relevant State aid rules (*i.e.* if it does not cover the same eligible costs) and in so far as it does not lead to overcompensation or exceed the maximum aid amount (defined by the level of the funding gap), in line with point 56 of the CEEAG. Germany further explained that during the bidding process, bidders will be required to declare that no cumulation of aid under the scheme with other support for the same eligible costs has taken place or will take place in the future.

2.8. Budget and financing

(213) Since 1 July 2022, Germany has abandoned the EEG levy. This implies that the notified measures are currently only financed through the general State budget. The financing mechanism through which the network operators can recover the cost of the support payments is now regulated by the new Energy Financing Act (‘*Energiefinanzierungsgesetz’*, ‘*EnFG*’) (see §58 of the EEG 2023). As was the case before, support payments by network operators need to be reimbursed by the TSO they are connected to (§13 EnFG). What is new compared to the EEG 2021, is that the TSOs are now entitled to reclaim their respective costs from the general budget (§6 EnFG).

(214) The estimated financing needs to implement the EEG 2023 are based on the same electricity price scenario as the funding gap calculations, explained in section 2.3.3. In addition, the budget estimates are based on the following assumptions:

(a) support is granted for a period of 20 years;

(b) the supported installations will be commissioned in the period 2023-2026; solar PV projects are assumed to be implemented within 1 year; onshore wind and biomethane installations are assumed to be implemented within 2 years;

(c) the expansion of renewable energy enshrined in the EEG 2023 will be carried out in accordance with the indicative capacity expansion path (see Table 2);

(215) On the basis of these assumptions, Germany provided the following annual expenditure and total budget estimates per technology. The figures are presented as a range since the actual budget will depend on the outcome of the tenders and other external factors such as the evolution of energy prices in the future.

(a) Onshore wind tenders: the estimated annual funding need lies between EUR 0 and 620 million; the total maximum budget over 20 years is estimated at EUR 3.8 billion.

(b) Onshore wind (not tendered): the estimated annual funding need lies between EUR 3 and 9 million; the total maximum budget over 20 years is estimated at EUR 57 million.

(c) Solar PV tenders: the estimated annual funding need lies between EUR 0 and 100 million and between EUR 0 and 120 million for ground-based and rooftop solar PV respectively; the total maximum budget over 20 years is estimated at EUR 260 million and EUR 1.4 billion for ground-based and rooftop solar PV respectively.

(d) Solar PV (not tendered): the estimated annual funding need lies between EUR 0 and 450 million; the total maximum budget over 20 years is estimated at EUR 3 billion.

(e) Biomass tenders: the estimated annual funding need lies between EUR 68 and 660 million; the total maximum budget over 10 (existing plants)/20 (new plants) years is estimated at EUR 11 billion.

(f) Biomass (not tendered): the estimated annual funding need lies between EUR 0 and 200 million; the total maximum budget over 20 years is estimated at EUR 3.5 billion.

(g) Biomethane tenders: the estimated annual funding need lies between EUR 43 and 260 million; the total maximum budget over 20 years is estimated at EUR 4.8 billion.

(h) Small non-tendered technologies (hydropower/geothermal power/landfill and sewage gas): the estimated annual funding need lies between EUR 9 and 14 million; the total maximum budget over 20 years is estimated at EUR 180 to 280 million.

(216) In summary, the entire EEG 2023 scheme has an estimated total maximum budget over 20 years of approximately EUR 28 billion.

2.9. Monitoring of costs

(217) With regard to the notified measures, the German authorities have committed to annually verify the production costs of typical installations (used as reference projects for the determination of the funding gap and the reference values) as part

of the domestic technology-specific monitoring reports ('*Forschungsvorhaben*') and compare them with the remuneration levels.

(218) On the basis of this annual monitoring, the German authorities commit to update the remuneration levels awarded in the future to installations where there is a risk of overcompensation. Moreover, the German authorities commit that, if the updated costs/revenues reveal that the support is no longer necessary for a category of beneficiaries, this category should be removed, in line with point 92 of the CEEAG.

2.10. Transparency

(219) Germany will ensure compliance with the transparency requirements laid down in points 58 to 61 of the CEEAG. The relevant data of the notified measures will be published on a national website that will link to the Commission transparency register.

2.11. Other commitments

(220) Germany has committed to respect both the waste hierarchy (transposed through the *Kreislaufwirtschaftsgesetz*), as well as the Water Framework Directive (transposed through the *Wasserhaushaltsgesetz*).

(221) Germany has also confirmed that the supported biomass and biomethane will comply with the criteria set out in the Renewable Energy Directive (EU) 2018/2001 ("RED II") ([40]). In particular, the supported biomethane will be compliant with the sustainability and greenhouse gas emissions saving criteria in RED II. For biomethane for other uses than transport, the objective is to achieve a reduction of at least 80 % of greenhouse gas emissions through the use of biomass. Germany has also confirmed that all the biomethane produced will be certified in accordance with RED II through the required certification systems for verification of compliance with the sustainability and greenhouse gas emissions saving criteria.

(222) As mentioned in recital (30), Germany will implement the requirements of Council Regulation (EU) 2022/1854.

(223) Germany confirmed that no aid can be granted to 'undertakings in difficulty' as defined by the Commission Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty ([41]), as reflected in §19(4) of the EEG 2023 in the case of non-tendered aid and in §30(2a) of the EEG 2023 in the case of tendered aid .

(224) Germany has committed that no aid will be granted to undertakings subject to an outstanding recovery order following a previous Commission decision declaring aid unlawful and incompatible with the internal market. This is also guaranteed by §19(4) of the EEG 2023 in the case of non-tendered aid and §§19(5), 30(2a)

([40]) Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (OJ L 327, 22.12.2000, p. 1).

([41]) Communication from the Commission – Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty (OJ C 249, 31.7.2014, p. 1).

and 34(1) of the EEG 2023 in the case of tendered aid, which provide the same safeguards to ensure that no aid will be granted to undertakings subject to an outstanding recovery order following a previous Commission decision declaring aid unlawful and incompatible with the internal market as to ensure that that no aid will be granted to 'undertakings in difficulty'.

2.12. Evaluation

(225) The notified measures will be part of the overall evaluation of the effects of the EEG 2021 scheme, for which Germany has committed to submit the final evaluation report to the Commission nine months before the end of the scheme, by 31 March 2026.

(226) In particular, Germany has added the following evaluation topics to the evaluation plan:

(a) Evaluation questions relevant for all tendered technologies:

– What has been the impact of the significant increase in the tender volumes as of 2022 on the competitiveness of the tenders?

– What has been the impact of the different volume control mechanism applied in the EEG 2021 and EEG 2023 (80% rule, ex ante volume control based on project pipeline, ex ante volume control based on results of previous tenders) on the competitiveness of the tenders?

– What has been the impact of the abolishment of the prohibition to self-supply? Has this led to a higher share of the electricity produced to be used for self-supply?

(b) Evaluation questions relevant for solar PV:

– To what extent has the introduction of a new segment with full grid injection for small rooftop solar PV installations, contributed to a more optimal use of the available rooftop space and to a higher degree of electricity produced by small rooftop installations being injected into the grid?

– What has been the impact of the new category of Garten-PV?

– What has been the impact of moving the special solar installations from the category of innovation tenders to the category of ground-based solar PV tenders? For instance, were more agri-PV and moor-PV installations granted aid under the system of innovation tenders or in the category of ground based solar PV tenders?

(c) Evaluation questions relevant for onshore wind:

– What has been the impact of the changes in the Reference Yield Model? Have more low quality wind sites been developed?

– Has the additional category of 50% quality sites been effective in realising more onshore wind installations in the South?

(d) Evaluation questions relevant for biomass and biomethane:

– Have the introduction of South quota for biomass and biomethane led to increased development of these technologies in the South of Germany?

(227) The evaluation of the EEG 2021 scheme is described in detail in recitals 218 to 235 of the Commission decision in case SA.57779. Other than the inclusion of the additional evaluation questions above, no other changes are made.

(228) Germany has furthermore confirmed that where an environmental impact assessment or an assessment is required under Directive 2011/92/EU ([42]), it will be carried out (Annex D to the DA on climate change mitigation and adaptation of the taxonomy), and that any necessary corrective and compensatory measures and audits will be carried out.

3. ASSESSMENT OF THE MEASURES

3.1. Presence of state aid

(229) Germany has notified the measures described in sections 2.4 and 2.5 as State aid. Germany submits that the notified measures are financed from State resources, due to the payment of financial means from the Federal budget into the EEG account.

(230) Article 107(1) TFEU states that *'any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods, shall, in so far as it affects trade between Member States, be incompatible with the common market'*.

(231) To determine whether a measure constitutes State aid within the meaning of Article 107(1) of the Treaty, the measure must:

(a) confer an advantage on certain undertakings or certain sectors (selective advantage),

(b) be imputable to the State and involve State resources,

(c) distort or threaten to distort competition, and

(d) be liable to affect trade between Member States.

3.1.1. Imputability and existence of State resources

(232) Only advantages which are granted directly or indirectly through State resources are to be regarded as aid within the meaning of Article 107(1) TFEU.

([42]) Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (OJ L 26, 28.1.2012, p. 1).

(233) The notified measures are imputable to the State and involve State resources. To that effect, the notified measures are established by law (EEG 2023) and implementing decrees (see section 2.1). The German authorities determine all elements of the scheme, including the beneficiaries, the conditions of eligibility in the scheme, and the scheme's budget. The notified measures are financed by the general State budget (see section 2.8).

3.1.2. Existence of a selective advantage

(234) Regarding the support of electricity generated from renewable energy sources, the Commission notes that the notified measures confer an advantage on certain electricity producers in the form of a direct grant (market premium or feed-in tariff). Those payments guarantee that, in particular at times when the electricity price is lower than the cost of electricity production, eligible electricity producers will obtain a remuneration for their electricity produced that is higher than the market price, enabling them to cover their costs, which would not be fully covered under normal market circumstances. They are thus advantaged by the notified measures.

(235) Furthermore, the aid is selective, since it only applies to specific RES electricity technologies provided for under the EEG, as opposed to conventional electricity production technologies.

3.1.3. Impact on trade between Member States and on competition

(236) The beneficiaries of the scheme are EEG electricity installations that are eligible for support under the EEG 2023. In all those sectors, trade takes place between Member States, and the beneficiaries are in competition with undertakings located in other Member States. In addition, the electricity market is liberalised and electricity is traded between Member States. The EEG electricity is generally sold on the spot market, where it enters in competition with all sources of electricity. The German spot market is interconnected with other markets.

(237) For all the reasons mentioned above, the measures are therefore liable to distort competition and affect trade between Member States.

3.1.4. Conclusion on the existence of aid

(238) The Commission concludes that the notified measures constitute State aid within the meaning of Article 107(1) TFEU. The German authorities do not contest that conclusion.

3.2. Lawfulness of the aid

(239) Germany confirmed that aid under the notified measures included in the EEG 2023 will only be granted following the notification of the Commission decision approving the notified measures (§105 EEG 2023, §14 InnAusV). Thus, regarding the notified EEG 2023 measures, Germany has complied with the standstill obligation set out in Article 108(3) TFEU.

(240) Regarding the crisis measures related to biogas, the Commission notes that Germany has not respected the standstill obligation set out in Article 108(3) TFEU and, in the context of the current crisis related to the war of aggression of

Russia against Ukraine, since October 2022, has already applied these crisis measures prior to the Commission's approval.

3.3. Compatibility of the aid

(241) The Commission has assessed the compatibility of the notified measures on the basis of Article 107(3)(c) TFEU. The notified measures aim at promoting economic activities in a manner that reduces greenhouse gas emissions and increases the level of environmental protection, as described in section 2.1. The supported activities fall within the scope of the CEEAG. More specifically they fall under the category of aid for the reduction and removal of greenhouse gas emissions, including through support for renewable energy (see point 16(a) of the CEEAG).

(242) The Commission has therefore assessed the notified measures as support for the producers of electricity from RES under the general compatibility provisions in Section 3 of the CEEAG, as well as the specific compatibility criteria for aid for the reduction and removal of greenhouse gas emissions including through support for renewable energy and energy efficiency in Section 4.1 of the CEEAG.

3.3.1. Positive condition: the aid must facilitate the development of an economic activity

3.3.1.1. Contribution to the development of an economic activity

(243) Article 107(3)(c) TFEU provides that the Commission may declare compatible '*aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest'*. Therefore, compatible aid under that provision of the Treaty must contribute to the development of certain economic activities (or of certain economic areas) ([43]). In accordance with this, point 23 of the CEEAG states that, when notifying aid, Member States must identify the economic activities that will be facilitated as a result of the aid and how the development of those activities is supported.

(244) The notified measures support the generation of electricity produced from renewable energy sources ([44]), therefore contributing to the development of economic activities in this sector.

(245) As explained in recitals (9) to (14), the notified measures contribute to increasing the use of RES for electricity production, hereby contributing (1) to the Union's

([43]) See judgment in case C-594/18 P, *Austria v Commission*, EU:C:2020:742 ('the *Hinkley* judgement'), paragraphs 20 and 24.

([44]) According to point 19(35) of the CEEAG, 'energy from renewable sources' means energy produced by plants using only renewable energy sources (namely wind, solar (solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, and biogas (as defined in Article 2(1) of the Renewable Energy Directive (EU) 2018/2001)), as well as the share in terms of calorific value of energy produced from renewable energy sources in hybrid plants which also use conventional energy sources and includes renewable electricity used for filling storage systems connected behind-the-meter (jointly installed or as an add-on to the renewable installation), but excludes electricity produced as a result of storage systems.

climate protection target of reducing greenhouse gas emissions by at least 55% by 2030, with a view to becoming climate neutral by 2050, and (2) to Germany's national target of generating 80% of electricity consumption from renewably energy sources by 2030, with a view to become climate neutral by 2045.

(246) The Commission therefore considers that the notified measures facilitate the development of certain economic activities as required by Article 107(3)(c) TFEU and points 23 and 25 of the CEEAG.

3.3.1.2. Incentive effect

(247) State aid can only be considered to facilitate an economic activity if it has an incentive effect. An incentive effect occurs when the aid induces the beneficiary to change its behaviour towards the development of an economic activity pursued by the aid, and if this change in behaviour would not otherwise occur without the aid ([45]).

(248) Point 29 of the CEEAG stipulates that aid does not normally present an incentive effect in cases where works on the projects started prior to the aid application. Additonally, in order to demonstrate the presence of an incentive effect, point 28 of the CEEAG requires Member States to identify the factual scenario and the likely counterfactual scenario in the absence of aid. Furthermore, point 28of the CEEAG requires the incentive effect of aid to be demonstrated through a quantification for the reference projects supported under the scheme following the description in point 51 of the CEEAG. Point 52 of the CEEAG explains that a counterfactual scenario may consist in the beneficiary not carrying out an activity or investment. Where evidence supports that this is the most likely counterfactual scenario, the net extra cost may be approximated by the negative NPV of the project in the factual scenario without the aid over the lifetime of the project (hence, implicitly assuming that the NPV of the counterfactual is zero).

(249) As noted in recital (38), absent the aid, there will be no investment in RES power plants, and that therefore the NPV of the counterfactual scenario is zero. This holds for each of the RES technologies assessed in this decision. As mentioned in recitals (68) and (140) regarding onshore wind projects, recitals (80) and (148) regarding ground-based solar PV installations, recitals (87), (162) and (185) regarding rooftop solar PV installations, recitals (107) and (174) regarding biomass/biogas plants, recital (118) regarding biomethane, recital (127) regarding innovative projects, recital (194) regarding hydropower and recital (208) regarding landfill and sewage gas plants, Germany submitted funding gap analyses showing significantly negative funding gaps for each of the relevant reference projects. As a consequence, the Commission considers that the projects will not be executed in the absence of the aid, given the gap between the cost to produce the electricity and the market price for electricity which is, considered over the lifetime of the solar PV project, generally lower. For geothermal energy, as mentioned in recital (202), Germany provided the LCOE of these projects which is over the lifetime of the projects higher than the electricity price.

([45]) See in that sense Section 3.1.2 of the CEEAG, as well as the *Hinkley* judgment, paragraphs 20 and 24.

(250) Regarding non-tendered support, mentioned in recital (142) regarding onshore wind projects, recital (151) regarding ground-based solar PV installations, recitals (164) and (187) regarding rooftop solar PV installations, recital (177) regarding biomass/biogas plants, recital (198) regarding hydropower and recital (210) regarding landfill and sewage gas plants, thanks to the support, the funding gap is reduced in all cases. In the case of ground-based and rooftop solar PV projects, biomass/biogas plants, and most hydropower reference plants the reduction is by more than 50%, in most cases even by more than 90%. This said, for some of the RES technologies, in particular for onshore wind, tenant electricity support, and landfill and sewage gas, the funding gap remains significantly negative even after EEG support, and is reduced by less than 50%. Germany submits that in these cases, not only monetary incentives play a role, but also non-financial incentives, such as the green image to customers for undertakings ([46]), for instance in the case of onshore wind. In the medium to long term, these investments might contribute to generating higher revenues, which help further reducing the funding gap. In the case of tenant electricity support, Germany acknowledges that the tenant electricity support does not pay off for all configurations of residences; this said for certain configurations the funding gap is reduced by 93%, which makes that the support has an incentive effect for some landlords. Finally, for landfill and sewage gas installations, which are usually undertaken by municipal utilities, the incentive to use these gases for electricity production does not primarily stem from monetary or profit-making incentives, but rather for climate protection reasons (avoidance of flaring these gases in the air).

(251) Germany further argues that this counterfactual is not changed or reversed due to currently high electricity market prices (see recital (32)). Germany explains that increases in electricity prices (even significant ones) do not absolve RES installations of the need to refinance themselves over their lifetime, and that it cannot be expected that the current electricity market prices will prevail on a lasting basis. Taking this into consideration, it is likely that less investment decisions would be made in favour of RES, without the aid, since the investment would entail higher risk and therefore higher financing costs. Thanks to the aid, a minimum revenue for RES investments is secured, which provides incentives to undertake RES projects (see recital (267)).

(252) As mentioned in recital (42), in the case of tendered support for new RES installations and existing biomass/biogas installations, the aid application, in this case a bid in a competitive bidding process, must occur before the start of the projects. Any bid in a tender procedure must include all the information as specified in recital (42), which includes the applicant's name, a description of the project or activity, including its location, and the amount of aid needed to carry it out. Therefore, the requirements in point 29 and 30 of the CEEAG are fulfilled. In the case of non-tendered support, as mentioned in recital (132), the aid is granted automatically in accordance with objective and non-discriminatory criteria and without further exercise of discretion by Germany; hence, point 31(a) of the CEEAG is complied with.

([46]) See study on 'Analyzing German Consumers' Willingness To Pay For Green Electricity Tariff Attributes: A Discrete Choice Experiment' available at https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-021-00291-8.

(253) As mentioned in recitals (94), (195) and (198), Germany also wants to keep existing dispatchable biomass/biogas plants and hydropower plants in the market, since they contribute to resolving network and system integration problems, and help Germany to reach its renewable energy targets. The Commission considers that the data shown by Germany demonstrate that without support, the operation of these plants is not profitable and would leave the market (see Table 7 and Table 21). Therefore, the support to existing/modernised biomass/biogas plants and hydropower plants provides an incentive effect to stay in the market. Existing biomass/biogas plants that want follow-up support have to take part in tenders, so the incentive effect is assessed in recital (252) above, and in line with points 29 and 30 of the CEEAG. For modernised hydropower plants, support is granted to existing installations when they extend their capacity. As mentioned in recital (132), the support is automatically granted on the basis of objective and non-discriminatory criteria and without further exercise of discretion by Germany; hence, point 31(a) of the CEEAG is complied with.

(254) The Commission therefore concludes that the aid has an incentive effect and facilitates the development of electricity production from RES installations.

3.3.1.3. No breach of any relevant provision of Union law

(255) State aid cannot be declared compatible with the internal market if the supported activity, the aid measure, or the conditions attached to it, entail a violation of relevant Union law. ([47])

(256) In the present case, the Commission has assessed in particular whether the measure contravenes any relevant Union legislation in the energy sector. Germany has confirmed that the measure entails no violation of any relevant Union Law:

(a) Germany has confirmed its compliance with the Water Framework Directive and the waste hierarchy (see recital (220)).

(b) Germany has confirmed that the supported biomass and biomethane will comply with the criteria set out in the Renewable Energy Directive ("RED II") (see recital (221)).

(c) Germany will timely implement Council Regulation (EU) 2022/1854 of 6 October 2022 on an emergency intervention to address high energy prices, by applying a revenue cap for RES technologies (see recital (30)).

(257) Therefore, the Commission considers that the notified measures do not infringe relevant Union law, and that the requirements of point 33 of the CEEAG are fulfilled.

3.3.1.4. Conclusion

(258) The Commission therefore concludes that the notified measures fulfil the first (positive) condition of the compatibility assessment *i.e.* that the aid facilitates the

([47]) CEEAG, point 33, and the *Hinkley* judgment, paragraph 44.

development of an economic activity pursuant to the requirements set out in CEEAG Section 3.1.

3.3.2. Negative condition: the aid cannot unduly affect trading conditions to an extent contrary to the common interest

3.3.2.1. The market affected by the aid measures

(259) The market affected by the aid is the market for electricity production in Germany.

3.3.2.2. The positive effects of the aid measures

(260) As indicated in section 3.3.1.1, the notified measures contribute to the development of a certain economic activity, *i.e.* the generation of electricity from renewable energy sources. The promotion of the development of renewable energy is one of the aims of the Union's policy on energy. The measure is also in full consistency with Germany's and the Union's RES and emissions targets (see recital (9)).

3.3.2.3. The need for State intervention

(261) Aid must be targeted towards a situation where it can bring about a material development that the market alone cannot deliver, for example by remedying market failures in relation to the projects or activities for which the aid is awarded.

(262) In order to demonstrate the necessity of aid, points 38 and 90 of the CEEAG explain that the Member State must show that the reference project(s) would not be carried out without the aid, taking into account the counterfactual situation, as well as relevant costs and revenues including those linked to measures identified in point 89. Point 89 of the CEEAG states that the Member State must identify the policy measures already in place to reduce greenhouse gas emissions. Point 91 of the CEEAG explains that where the Member State demonstrated that there is a need for aid, the Commission presumes that a residual market failure remains, which can be addressed through aid for decarbonisation, unless it has evidence to the contrary. To ensure that aid remains necessary for each eligible category of beneficiary, Member States must update their analysis of relevant costs and revenues at least every three years for schemes that run longer than that, as set out in point 92 of the CEEAG.

(263) In order to show the necessity of the aid, Germany provided calculations of the net present value ('NPV') for each of the reference RES installations without EEG support.

(264) The relevant parameters for each type of reference project on which the funding gap calculations are based, as well as the outcome of the funding gap analyses without EEG support, are presented in Table 4 and Table 10 regarding onshore wind installations (tendered and non-tendered), Table 5 and Table 12 regarding ground-based solar PV installations (tendered and non-tendered), Table 6, Table 15 and Table 19 regarding rooftop solar PV installations (tendered, non-tendered and tenant electricity), Table 7 and Table 17 regarding biomass/biogas installations (tendered and non-tendered), Table 8 regarding biomethane

installations (tendered) and Table 9 regarding innovative installations (tendered), Table 21 regarding hydropower (non-tendered) and Table 23 regarding landfill and sewage gas plants (non-tendered). As explained in recital (38), Germany argues that the counterfactual situation consists of no execution of the project. The Commission considers this a credible counterfactual scenario and therefore accepts that the funding gap equals the NPV of the project without EEG support. For geothermal energy, as mentioned in recital (202), Germany provided the LCOE of these projects which is over the lifetime of the projects higher than the electricity price, and therefore justifies the need for support.

(265) The results of the funding gap analyses for the reference projects, which the Commission has reviewed, show the existence of a funding gap: without EEG support, the net present value of the cash flows of the projects over the economic lifetime of 20 years is highly negative (see tables referred to in recital (262)), and this in all of the relevant reference scenarios. This implies that without any support measures, an investor would not have an incentive to invest in RES projects, as the investment would be highly unprofitable. Hereby, Germany has proven that there is a need for aid, and according to point 91 of the CEEAG, the Commission presumes a residual market failure remains which can be addressed through aid for decarbonisation. The Commission has no evidence to the contrary.

(266) Despite other policy measures already in place to reduce greenhouse gas emissions ([48]), Germany aims at continuing to incentivise the investments in renewable energy production. Germany argues this is necessary in order to attain its national and EU climate targets in terms of renewable energy production.

(267) As shown by the results of the funding gap analyses (see recital (264)), despite the current and in the short-term high electricity prices, Germany submits that it cannot be taken for granted that future electricity prices will remain high. As mentioned in point 90 of the CEEAG, "*where there is significant uncertainty concerning future market developments, as for example may be the case for renewable energy investments where electricity revenues are not coupled to input costs, support in the form of a certain guaranteed remuneration to limit exposure to negative scenarios may be considered necessary to ensure that the private investment takes place*". The Commission considers that even at times of very high electricity prices (as is the case in 2022) support to RES might still be necessary, since the support provides a minimum price covering merely the cost of investment; since a minimum price is guaranteed, RES investments will not be blocked in uncertain times. The Commission notes in this respect that since the measures in the EEG 2023 have a proper tender design (including safeguards) and since the support is generally (for installation above 100 kW) designed as a market premium on top of electricity price, no EEG support will be paid out when electricity prices are high, hereby avoiding overcompensation.

(268) This said, point 90 of the CEEAG also requires that, at times of high uncertainty about future level of electricity prices, even though there might still be a need for

([48]) For more details, see the Climate Protection Report 2022 ("Klimaschutzbericht 2022") of the German Federal Government, published on 31 August 2022. Available at: https://www.bmwk.de/Redaktion/DE/Downloads/Energie/klimaschutzbericht.pdf?__blob=publicationFile&v=6. The report lays down the most relevant climate protection measures in more detail.

RES support, "*limits to profitability and/or clawbacks may be required to ensure proportionality*" (see section 3.3.2.7.3).

(269) To ensure that aid remains necessary for each eligible category of beneficiary, Member States must update their analysis of relevant costs and revenues at least every three years for schemes that run longer than that, as set out in point 92 of the CEEAG. Since the EEG 2023 is running for at least 4 years (the approval under this decision is provided until end 2026), Germany has committed to do regular checks of the parameters in the funding gap calculations during their annual national monitoring exercise (see recital (217)), in line with point 92 of the CEEAG. Germany has also committed that where the results of their annual monitoring exercise show that there is no further need for the aid for each category of beneficiary, the category should be removed before further aid is granted (see recital (218)), in line with point 92 of the CEEAG.

(270) Given the existence of significantly negative funding gaps for each of the reference projects of RES installations, the Commission considers that the notified measure is necessary to support the targeted economic activities and, moreover, in a manner that increases environmental protection.

3.3.2.4. The appropriateness of the aid

(271) Points 39 and 43 of the CEEAG explain that the proposed aid measure must be an appropriate policy instrument to achieve the intended objective of the aid, that is to say there must not be a less distortive policy and aid instrument capable of achieving the same results.

(272) Point 93 of the CEEAG states that the Commission presumes the appropriateness of State aid for achieving decarbonisation goals provided all other compatibility conditions are met. It further sets out that, given the scale and urgency of the decarbonisation challenge, a variety of instruments, including direct grants, may be used.

(273) The Commission therefore considers that, in light of the overall assessment of the compatibility of the measure, the aid in the form of direct grants to support the production of renewable electricity in each of the notified measures, is an appropriate instrument to support the targeted economic activity and, moreover, in a manner that increases environmental protection.

3.3.2.5. Eligibility

(274) Point 95 of the CEEAG explains that decarbonisation measures targeting specific activities which compete with other unsubsidised activities can be expected to lead to greater distortions of competition, compared to measures open to all competing activities. As such, Member States should give reasons for measures which do not include all technologies and projects that are in competition. Furthermore, Member States must regularly review eligibility rules and any rules related thereto to ensure that reasons provided to justify a more limited eligibility continue to apply for the lifetime of each scheme, as set out in point 97 of the CEEAG.

3.3.2.5.1. Separate support measures per RES technology

(275) For the reasons explained in recital (48), Germany argues that it is important to have a diverse mix of technologies. In particular, Germany also argues that given the significant cost differences between different technologies (see recital (49)), it would not be opportune to have one joint tender for all technologies together, as this would lead to overcompensation of the cheaper technologies. Germany therefore considers the continued separation of tenders per technology justified. Taking into account the above arguments, the Commission considers the justifications for having separate tenders per technology appropriate and notes that the need to have separate technology-specific tenders will also be addressed in the evaluation of the EEG 2023, in line with point 97 of the CEEAG.

(276) For the reasons provided by Germany related to the need to have a diverse mix of technologies (see recital (48)) and the observation that different technologies have different costs (see recital (49)), the Commission considers that the restricted eligibility criteria for the notified measures are justified.

3.3.2.5.2. Innovative installations

(277) As mentioned in recital (125), Germany submits that, through the innovation tender, a strong technology neutral element is maintained in the tenders, as installations based on all RES sources, as well as storage, can participate in them.

(278) In this respect, the Commission notes that single RES installations are already eligible for support under tenders or through administratively set premiums and tariffs. Further, as mentioned in recital (122), the Commission finds that the objective of the innovation tenders is to support installations providing specific services to the grid (for example, stable or flexible production by linking intermittent RES production with storage or by linking several intermittent RES installations with complementary feed-in profiles). This is particularly important in light of the increasing RES deployment and the high amount of intermittent RES in Germany. Taking into account the above arguments, the Commission considers the justifications for having separate innovation tenders appropriate and notes that the need to have separate innovation tenders will also be addressed in the evaluation of the EEG 2023, in line with point 97 of the CEEAG.

(279) The Commission therefore finds the delimitation of the innovation tenders to be in line with point 95 of the CEEAG.

3.3.2.5.3. Onshore wind measure for South region

(280) As mentioned in recital (59)(b), Germany made further adjustments to the reference yield model, including the introduction of a 50% wind quality site which applies only to the South of Germany.

(281) The Commission notes that the operation of onshore wind installations in the South of Germany is more expensive than in the North. Indeed, for the reasons mentioned in recital (62), the funding gap of a typical onshore wind turbine in the North is about half as big as the funding gap of a typical installation in the South (see recital (64)).

(282) In addition, the Commission notes that from the point of view of total system costs, having more onshore wind installations developed in the South of Germany will overall lead to a reduction in system integration costs. Due to the grid constraints in Germany, transmission of green energy from the North to the South is not always feasible and electricity produced by onshore wind installations in the North is curtailed instead of being transferred to the South. Germany has calculated that a conservative estimate of the overall net savings of the measure amount to EUR 184 million per year (see recital (65)). Taking into account the above arguments, the Commission considers the justifications for having specific support to onshore wind plants in the South appropriate and notes that the effect of the regional measure for onshore wind will also be addressed in the evaluation of the EEG 2023, in line with point 97 of the CEEAG.

(283) The Commission therefore finds the additional wind quality site in the South region to be in line with point 96(f) of the CEEAG.

3.3.2.5.4. South quota for biomass and biomethane

(284) As mentioned in recitals (100) and (115), Germany introduced South quota in the tenders for biomass and biomethane, whereby a certain percentage of the tender volume (50% and 100% respectively) is reserved to the South of Germany.

(285) The Commission notes that the operation of biomass and biomethane in the South of Germany is somewhat more expensive than in the North. Indeed, for the reasons mentioned in recital (101)(a), the LCOE of typical biomass/biomethane installation in the South is higher than for a typical installation in the North.

(286) More importantly, the Commission notes that from the point of view of total system costs, having more biomass/biogas and biomethane plants developed in the South of Germany will overall lead to a reduction in system integration costs. Due to the grid constraints in Germany, transmission of green energy from the North to the South is not always feasible and electricity produced by biomass/biogas and biomethane installations in the North is curtailed instead of being transferred to the South. Germany has calculated that a conservative estimate of the overall net savings of the measure amount to EUR 35 700 000 million per year (see recital (101)(c)). Taking into account the above arguments, the Commission considers the justifications for having specific support to biomass and biomethane plants in the South appropriate and notes that the effect of the regional measure for biomass and biomethane will also be addressed in the evaluation of the EEG 2023, in line with point 97 of the CEEAG.

(287) The Commission therefore finds the South quota for biomass and biomethane to be in line with point 96(f) of the CEEAG.

3.3.2.6. Public consultation

(288) Point 99 of the CEEAG requires Member States to consult publicly on the competition impacts and proportionality of proposed measures, prior to the notification of aid. The respective requirements apply only to measures approved from 1 July 2023. Therefore, point 99 of the CEEAG is not applicable to the measures under assessment.

3.3.2.7. The proportionality of the aid, including cumulation

(289) Point 47 of the CEEAG explains that State aid is considered to be proportionate if the aid amount per beneficiary is limited to the minimum needed for carrying out the aided project or activity. Point 103 of the CEEAG states that aid for reducing greenhouse gas emissions should, in general, be granted through a competitive bidding process, while point 104 of the CEEAG explains that this bidding process should, in principle, be open to all eligible beneficiaries to enable a cost effective allocation of aid and to reduce competition distortions.

(290) Point 56 of the CEEAG explains that when aid under one measure is cumulated with aid under other measures, Member States must specify the method used to ensure that the total amount of aid for a project or an activity does not lead to overcompensation or exceed the maximum aid amount allowed under the CEEAG.

3.3.2.7.1. Non-tendered technologies

(291) Since the reference projects in the case of non-tendered aid to onshore wind, solar PV, biomass and biomethane under this scheme are projects below 1 MW, the projects are small projects as defined in point 107(b)(i) of the CEEAG (([49])). The aid can thus be granted without a competitive bidding process, in line with point 107(b) of the CEEAG, which states that exceptions from the requirement to allocate aid and determine the aid level through a competitive bidding process can be justified where beneficiaries are small projects.

(292) For hydropower, deep geothermal installations and sewage/landfill gas installations, the aid is also granted without a competitive bidding process. As mentioned in recitals (190), (200) and (205), the number of projects is small and declining. By the very nature of these projects, it is also not possible to increase competition by reducing the budget or facilitating participation in the bidding process. The aid can thus be granted without a competitive bidding process, in line with point 107(a) of the CEEAG, which states that exceptions from the requirement to allocate aid and determine the aid level through a competitive bidding process can be justified where there is insufficient potential supply or number of potential bidders to ensure effective competition.

(293) Also pilot installations and renewable energy community projects are exempted from participating in tenders. Pilot installations qualify for support as demonstration projects in line with points 96(b) and 107(a) of the CEEAG, such support not being distortive of competition. Renewable energy community projects for onshore wind installations of up to 18 MW and solar energy installations of up to 6 MW are also exempted from participating in tenders, in line with points 107(b)(iv) and 107(b)(v) of the CEEAG.

(294) For aid granted without the use of a competitive bidding process, point 48 of the CEEAG specifies that aid will be considered as "*limited to the minimum needed for carrying out the aided project or activity*" if the aid corresponds to the net extra cost ('funding gap') necessary to meet the objective of the aid measure,

())([49]) Point 107(b)(i) CEEAG specifies that small projects for electricity generation are defined as projects below or equal to 1MW.

compared to the counterfactual scenario in the absence of aid. The net extra cost is determined by the difference between the economic revenues and costs (including the investment and operation) of the aided project and those of the alternative project which the aid beneficiary would credibly carry out in the absence of aid.

(295) As explained in recital (38), Germany has clarified that the relevant counterfactual scenario is the non-execution of the project; hence, the maximal aid amount that can be granted corresponds to the funding gap of the project in case it is carried out without aid. In other terms, the EEG support merely helps covering the funding gap, taking into account an appropriate discount factor that reflects a reasonable profit. The Commission agrees that the relevant counterfactual scenario is indeed the non-execution of the project, since for RES projects, the switch to another more environmentally-friendly project is not possible; put otherwise, either the RES project is executed, or it is abandoned. The Commission considers the use of the WACC as discount factor appropriate, and considers a WACC of 7% and approximately 4% in the case of no EEG support and EEG support respectively as appropriate, reflecting also the higher financing risk in the case no support is granted.

(296) The relevant parameters for the calculation of the NPV of the reference projects have been provided in Table 10 for small onshore wind installations, Table 12 for small ground-based solar PV installations, Table 15 and Table 19 for small rooftop solar PV installations and tenant solar electricity, Table 17 for small biomass/biogas installations, Table 21 for hydropower installations and Table 23 for landfill and sewage gas installations. The results of the funding gap calculations for the relevant reference projects with EEG support (with each time a NPV of the counterfactual scenario of zero) are presented in Table 11 for small onshore wind installations, Table 13 for small ground-based solar PV installations, Table 16 and Table 20 for small rooftop solar PV installations and tenant solar electricity, Table 18 for small biomass/biogas installations, Table 22 for hydropower installations and Table 24 for landfill and sewage gas installations. The Commission considers the choice of reference projects relevant, reflecting for each technology the typical sizes and types of installations. The cash flows of the funding gap analysis are based on energy market models by the energy consultant “Brainpool”. The Commission acknowledges the difficulty to forecast the relevant costs and revenues of the RES projects in current uncertain market circumstances due to the war of aggression of Russia against Ukraine, but considers the data used in the analysis appropriate. In particular, the Commission considers the analysis appropriate in the light of the fact that until end April 2024 an *ex post* clawback will be applied in line with the requirements of Regulation 2022/1854 and point 55 of the CEEAG, and that Germany has committed to introduce as of July 2024 limits to profitability and/or clawbacks (see section 3.3.2.7.3).

(297) The results of the funding gap analyses for all reference projects in the area of onshore wind, solar PV, biomass/biogas hydropower and landfill/sewage gas show that (1) without EEG support the net present value of the cash flows of the projects over the economic lifetime of 20 years is highly negative (*i.e.* a significant funding gap exists), and (2) the EEG support reduces the funding gap and for some of the reference projects even makes the NPV of the project close to 0. The NPVs of the supported projects are still negative for all of the reference

projects, which ensures that the typical small RES installations will not be overcompensated under the notified measures.

(298) Regarding ground-based and rooftop solar PV projects, biomass/biogas plants, and most hydropower reference plants, as mentioned in recital (250), the funding gap is reduced by more than 50%, and in many cases by more than 90%; hence, the Commission considers this as proof that the EEG support improves the profitability of these projects and ensures their actual development without leading to overcompensation of the beneficiaries.

(299) Regarding onshore wind projects, tenant electricity support, large modernised hydropower plants and landfill and sewage gas plants, as mentioned in recital (250), the support reduces the funding gap by less than 50%. Germany explains that this will not be a burden to the development of the projects, since these installations are not only built for profitability reasons, but other (non-monetary) aspects are considered as well in the investment decisions, such as securing against rising electricity prices, reducing one's own carbon footprint and contributing in this way to the "*Energiewende*" (see recitals (142), (187), (198), (210) and (250)). Going forward, Germany also commits to monitor the parameters on which the level of support is based and will adjust where appropriate to avoid overcompensation (see recitals (217) and (218)).

(300) As mentioned in point 54 of the CEEAG, in certain circumstances, it may be difficult to fully identify the benefits and costs to the beneficiary and hence to quantify the NPV in the factual and counterfactual scenarios. In this case, alternative approaches for those cases may be applied. This turns out to be the case for deep geothermal power, as mentioned in recital (201). Germany submitted LCOE calculations instead, showing that the amount of the support does not exceed the LCOE (see recital (201)).

(301) As mentioned in recital (212), Germany has committed to comply with the rules on cumulation. Therefore, the Commission considers that point 56 of the CEEAG is complied with.

(302) Article 30 of Directive 2018/2001 (RED II) on verification of compliance with the sustainability criteria was transposed in Germany by the Biomass Electricity Sustainability Regulation. According to that provision, operators receive support under the EEG only if sustainability requirements are met.

(303) On the basis of the foregoing, the Commission concludes that the aid regarding the non-tendered notified measures is proportionate.

3.3.2.7.2. Tendered technologies

(304) The support allocated to large onshore wind installations, large ground-based and rooftop solar PV installations, large biomass and biomethane installations, as well as to innovative installations, is granted through a competitive bidding procedure and awarded through a sliding market premium. Germany committed to monitor the parameters on which the tenders are based in order to avoid overcompensation (see recitals (217) and (218)). The reasoning for having technology-specific tenders and to have a separate category for innovation tenders, has been explained in recitals (277) to (279).

(305) As explained in recital (49), given that there is a significant deviation between the bid levels of beneficiaries participating in tenders of different technologies, separate competitive bidding processes may be used, in line with point 104(b) of the CEEAG.

(306) Since Germany relies on the exceptions in point 104(b) of the CEEAG, it will adapt the scheme over time to ensure that technologies expected to bid within 10% of each other are tendered through the same competitive bidding process, in line with point 105 of the CEEAG.

(307) Point 49 of the CEEAG states that "*a detailed assessment of the net extra cost will not be required if the aid amounts are determined through a competitive bidding process, because it provides a reliable estimate of the minimum aid required by potential beneficiaries*". Point 49 of the CEEAG sets out the conditions under which aid allocated through a competitive bidding process can be considered proportionate ([50]), while point 50 of the CEEAG explains that the selection criteria used for ranking bids should put the contribution to the main objectives of the measure in relation with the aid amount requested by the applicant.

(308) All RES tenders organised under the EEG 2023 are open, clear, transparent and non-discriminatory for all eligible RES installations, and they therefore comply with point 49(a) of the CEEAG ([51]). Tender criteria are made public in advance ([52]), no earlier than eight weeks and no later than five weeks before the respective bidding date, therefore complying also with point 49(b) of the CEEAG.

(309) As explained in recitals (55), (111) and (112), the tender volumes related to the onshore wind and biomethane tenders respectively are subject to a volume control mechanism, whereby the BNetzA can reduce the tender volume in case the pipeline of projects is expected to be lower than the volume tendered. As a consequence, the tender volume for onshore wind and biomethane tenders is a binding constraint, as it can be expected that not all bidders will receive aid, and

([50]) Namely: a) The bidding process is open, clear, transparent and non-discriminatory, based on objective criteria, defined ex ante in accordance with the objective of the measure and minimising the risk of strategic bidding; b) The criteria are published sufficiently far in advance of the deadline for submitting applications to enable effective competition; c) The budget or volume related to the bidding process is a binding constraint in that it can be expected that not all bidders will receive aid, the expected number of bidders is sufficient to ensure effective competition, and the design of undersubscribed bidding processes during the implementation of a scheme is corrected to restore effective competition in the subsequent bidding processes or, failing that, as soon as appropriate; and d) *Ex post* adjustments to the bidding process outcome are avoided as they may undermine the efficiency of the process's outcome.

([51]) For instance: §29 of the EEG requires the BNetzA to publish the tender details in advance; §30 requires the listing of the requirements of a bid in a clear and transparent manner, and it follows from these criteria that they do not discriminate against anyone, except for the regional measures where some privileges are granted to installations in the South of Germany (justified by the fact that this will lead to overall system cost savings); §32 guarantees that the highest bid is awarded the contract; §35 requires the publication of the tender outcomes.

([52]) The procedure for the participation in innovation tenders, including the relevant dates and the tender criteria, is provided on the website of the Federal Network Agency (*Bundesnetzagentur*): https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Ausschreibungen/Innovation/start.html.

therefore point 49(c) of the CEEAG is complied with. The volume control mechanism applies only *ex ante*, and no *ex post* adjustments to the bidding process can be made, and therefore point 49(d) of the CEEAG is also complied with.

(310) As of 2024, the EEG 2023 will introduce a volume control mechanism to ensure the competitiveness of the ground-based solar PV tenders. The mechanism is explained in detail in recital (76)(b). Regarding rooftop solar PV tenders, Germany has committed to introduce a similar volume control mechanism as is the case for ground-based solar PV as soon as two tender rounds are significantly undersubscribed (see recital (85)). As a consequence, as of 2024, the tender volume for ground-based and rooftop solar PV tenders is a binding constraint, as it can be expected that not all bidders will receive aid, and therefore point 49(c) of the CEEAG is complied with. The volume control mechanism applies only *ex ante*, and no *ex post* adjustments to the bidding process can be made, and therefore point 49(d) of the CEEAG is also complied with.

(311) Germany has provided an estimate of the extended category of ground-based solar PV, including exceptionally in 2023 installations up to 100 MW, and in general including the special solar installations (which were previously part of the innovation tenders). In addition, regarding rooftop PV tenders, Germany decreased the tender volume of 2023 in line with the average awarded tendered volume in the first two tenders of 2022. As a consequence, the Commission concludes that the ground-based and rooftop solar PV tenders can be expected to be competitive in 2023.

(312) The biomass tenders keep as a volume control mechanism the 80% rule (see recital (93)). The tender volume is a binding constraint, as in case of undersubscription of the tender, not all bidders will receive aid. Point 49(c) of the CEEAG is therefore complied with. While point 49(d) of the CEEAG states that *ex post* adjustments to the bidding process outcome are in principle to be avoided, Germany has argued that the biomass tenders are primarily aimed at keeping existing biomass plants online, rather than giving incentives to invest in new biomass installations. As explained in recital (93), an *ex ante* volume control mechanism as for onshore wind and biomethane cannot be applied, since it is not clear when existing biomass plants will participate in the tender for follow-up support for an additional 10 years. In addition, Germany argues that the 80% rule will not lead to a negative spiral, since the aid concerns mainly existing plants. The Commission accepts this reasoning because it agrees that the support is targeted at existing plants, and the tender volumes for biomass are decreasing over time (see Table 3). The Commission agrees that no other volume control mechanism can be applied in the case of biomass and therefore accepts the 80% rule.

(313) Regarding innovation tenders, the 80% rule, whereby in case of undersubscription only the lowest 80% of bids are to be awarded, has been replaced by a volume control mechanism that works along the same lines as the mechanism for ground-based solar PV (see recital (124)). As a consequence, as of 2023, the tender volume for innovation tenders is a binding constraint, as it can be expected that not all bidders will receive aid, and therefore point 49(c) of the CEEAG is complied with. The volume control mechanism applies only *ex ante*, and no *ex*

post adjustments to the bidding process can be made, and therefore point 49(d) of the CEEAG is also complied with.

(314) Finally, the volume control mechanism also applies to the South quota for biomass and biomethane: for biomethane, this is by definition the case, since all support granted goes to biomethane plants in the South; for biomass, as explained in recital (103), the 80% rule applies also to the South quota segment, which ensures the proportionality of the aid also in the South quota segment.

(315) Point 50 of the CEEAG explains that the selection criteria used for ranking bids should put the contribution to the main objectives of the measure in relation with the aid amount requested by the applicant. The Commission notes that the sole ranking criterion in all RES tenders is the value of the bid (see recital (43)), more specifically the amount of aid requested per unit of electricity produced (ct/kWh). The Commission considers this criterion to be appropriate and straightforward to implement. Therefore, the requirements in point 50 of the CEEAG are fulfilled.

(316) As mentioned in recital (212), Germany has committed to comply with the rules on cumulation. Therefore, the Commission considers that point 56 of the CEEAG is complied with.

(317) Article 30 of Directive 2018/2001 (RED II) on verification of compliance with the sustainability criteria was transposed in Germany by the Biomass Electricity Sustainability Regulation. According to that provision, operators receive support under the EEG only if sustainability requirements are met.

(318) Finally, the Commission considers the tender design appropriate in the light of the fact that until end April 2024 an *ex post* clawback will be applied in line with the requirements of Regulation 2022/1854 and point 55 of the CEEAG, and that Germany has committed to introduce as of July 2024 limits to profitability and/or clawbacks (see section 3.3.2.7.3).

(319) Therefore, the Commission considers that all RES tenders are competitive bidding procedures, and therefore concludes that the aid is proportionate.

3.3.2.7.3. Clawback

(320) The Commission takes note of Germany's commitment to limit profitability and/or to implement clawbacks as required by point 90 of the CEEAG for contracts entered into when there is significant uncertainty concerning future market development to ensure proportionality also in this case, for all installations that are awarded a contract in a tender as of 1 July 2024.

(321) In line with point 55 CEEAG, for the period up to April 2024, the Commission notes that Germany will apply an *ex post* clawback, set out by the rules implementing Regulation 2022/1854 in Germany.

(322) On the basis of the foregoing, the Commission concludes that the aid regarding the notified measures is proportionate, also because of the application of the *ex post* clawback in 2023 (potentially extended thereafter), and welcomes Germany's commitment to limit profitability and/or to implement clawbacks as of July 2024.

3.3.2.8. The transparency of the aid

(323) Germany will ensure compliance with the transparency requirements laid down in points 58 to 61 of the CEEAG (recital (219)). The relevant data of the notified measures will be published on a national website that will link to the Commission's transparency register.

3.3.2.9. Avoidance of undue negative effects of the aid on competition and trade

(324) Point 70 of the CEEAG explains that the Commission will approve measures under these guidelines for a maximum period of 10 years. As stated in section 2.6, the EEG 2023 scheme will be approved for a period of 4 years, from 1 January 2023 to 31 December 2026. Point 70 of the CEEAG is therefore complied with.

(325) Point 116 of the CEEAG explains that the aid must not merely displace the emissions from one sector to another and must deliver overall greenhouse gas emissions reductions. Furthermore, points 127 to 129 of the CEEAG require Member States to explain how they intend to avoid the risk of aid eventually stimulating or prolonging the consumption of fossil-based fuels and energy.

(326) Germany explains that all electricity produced by the aided projects must be renewable (see recital (14)), and should thus not prolong the consumption of fossil-based fuels, nor lead to a mere sectoral displacement of emissions. The Commission therefore notes that the requirements referred to in points 116, 127 and 129 of the CEEAG are not relevant for the notified measures.

(327) Point 120 of the CEEAG explains that Member States must demonstrate that reasonable measures will be taken to ensure that projects granted aid will actually be developed. As mentioned in recitals (42) and (132), the aid is only paid out once the installation has been commissioned and started operating. As mentioned in recitals (70) regarding tendered onshore wind installations, recitals (81) and (88) regarding tendered solar PV installations, recital (109) regarding tendered biomass/biogas plants, recital (120) regarding tendered biomethane plants, recital (128) regarding innovation tenders and recital (132) regarding all non-tendered technologies, guarantee payments and penalties apply. In the case, of tendered rooftop solar PV, the implementation deadline for projects has been abolished, but the fact that the duration of the support is location-specific and limited in time, ensures that operators have incentives to develop the projects as soon as possible in order to benefit longer from the support. Therefore, the Commission considers that point 120 of the CEEAG is complied with for all RES technologies.

(328) Point 121 of the CEEAG explains that aid which covers costs mostly linked to operation rather than investment should only be used where the Member State demonstrates that this results in more environmentally-friendly operating decisions. Point 122 of the CEEAG states where aid is primarily required to cover short-term costs that may be variable, Member States should confirm that the production costs on which the aid amount is based will be monitored and the aid amount updated at least once per year.

(329) Germany submits that the notified measures concerning onshore wind and solar PV (regular and innovative installations) do not cover costs mostly linked to operation or variable short-term costs, but intend to cover both the initial fixed

investment costs and the operating costs over the lifetime of the investment. The funding gap analyses for the reference projects provided by Germany show indeed that the share of operating costs in the total cost of the onshore wind and solar PV reference project lies between 14% and 35% in all relevant cases (see recitals (68), (80), (87), (127), (140), (148), (162)). Therefore, the Commission considers that points 121 and 122 of the CEEAG are complied with for the notified measures concerning onshore wind and solar PV (including innovative projects). Regarding new hydropower projects, the share of operating costs in the total cost of the investment represent just over 35%, so the aid covers mainly the investment costs (see recital (194)). Also in the case of geothermal power projects, the support mainly covers the high investment costs (see recital (200)).

(330) In the case of biomass/biogas (both new and existing) plants, biomethane plants, existing hydropower plants and new landfill/sewage gas plants, the operating costs represent more than 50% of the total costs (see recitals (107), (118), (174), (194) and (208)). As a consequence, in these cases the support does not primarily cover the investment cost. Germany submitted that in the case of biomass/biogas, biomethane and hydropower plants, the support results nevertheless in more environmentally-friendly operating decisions, because otherwise such installations would leave the market and/or would use natural gas, which is to be avoided at times in which gas is scarce and expensive (see recitals (94) and (198)). The dispatchable biomass/biogas, biomethane and hydropower plants also contribute to avoiding grid congestion issues (see recitals (65) and (100)). In the case of landfill and sewage gas installations, Germany also submits that without support these gases would merely be flared, resulting in more environmental harm, than when the gases are processed and used to generate electricity (see recital (210)). Therefore, the aid complies with point 121 of the CEEAG. Germany will also monitor the operating costs as part of the domestic technology-specific monitoring reports ('*Forschungsvorhaben*'). Should a report show that overcompensation occurs, necessary changes will be implemented in a timely manner, and the aid amount updated at least once a year (see recitals (108) and (119)). Therefore, the aid complies with point 122 of the CEEAG.

(331) Point 123 of the CEEAG explains that the aid must be designed to prevent any undue distortion to the efficient functioning of markets, and preserve efficient operating incentives and price signals.

(332) As mentioned in recital (26), currently no subsidy will be paid for hours in which the spot market price is negative, whenever negative prices persist for at least 4 consecutive hours. Germany has committed to gradually phase-out this rule along the steps specified in recitals (26)(a), (26)(b) and (26)(c), so that by 1 January 2027, no subsidy will be paid during any time of negative electricity prices, in line with point 123 of the CEEAG. Germany argues that it is necessary that the phase-out takes place gradually for system security reasons. The market participants need to adapt their behaviour to the new circumstances and take into account the new rules when bidding in future tenders. In a situation of the current energy crisis, changes in legislation should reflect the need for gradual transition. The phase-out also gives the possibility to observe the market reaction to the changes and find European-wide solution for this problem.

(333) In case the execution of the phase-out plan would lead to technical risks threatening system stability, Germany, after having informed and in agreement

with the Commission, may deviate from the plan, as mentioned in recital (27). Germany claims, that the lack of support at times of negative prices will lead to risks for the network stability, as RES producers will stop electricity generation at once and a sudden drop of RES production could create frequency or voltage instability.

(334) As explained in footnote 70 of the CEEAG ([53]), small-scale installations are not obliged to participate in the market and the requirements of point 123 of the CEEAG do not apply to them. ([54])

(335) As regards the innovation tender measure, Germany confirms that no remuneration is paid, as soon as the spot price is negative (§9 InnAusV, see recital (123)).

(336) Points 124 and 125 of the CEEAG state that the Commission will carry out a case-by-case assessment for measures that include dedicated infrastructure projects, taking into account steps to mitigate the distortive effect of aid to such infrastructure. The Commission notes that this requirement is not relevant for the measures at stake as no aid under the notified measures covers dedicated infrastructure.

(337) Point 131 of the CEEAG explains that, where risks of additional competition distortions are identified or measures are particularly novel or complex, the Commission may impose conditions, including the obligation to perform an *ex post* evaluation, as set out in point 76 of the CEEAG. As indicated in section 2.12, the notified measures will be evaluated as part of the overall evaluation of the EEG 2021.

(338) Point 132 of the CEEAG states that Member States should demonstrate how the proposed measure will not lead to distortions of competition, for example, through increased market power, should the measure be expected to benefit a particularly limited number of beneficiaries. Since the notified measures target a large amount of small and large beneficiaries, the Commission notes that this requirement is not relevant for the notified measures.

(339) Point 133 of the CEEAG states that where the aid is granted without a competitive bidding process and the measure benefits a particularly limited number of beneficiaries or an incumbent beneficiary, the Commission may require the Member State to ensure that the beneficiary disseminates the know-how obtained as a result of the aided project with the aim of accelerating the roll-out of the successfully demonstrated technologies. Since the notified measures target common technologies for RES development, the Commission notes that this requirement is not relevant for the notified measures.

([53]) Footnote 70 of the CEEAG states that: "*Small-scale renewable electricity installations may benefit from direct price support that covers the full costs of operation and does not require them to sell their electricity on the market, in line with the exemption in Article 4(3) of the Renewable Energy Directive (EU) 2018/2001. Installations will be considered as small-scale if their capacity is below the applicable threshold in Article 5 of Regulation (EU) 2019/943*".

([54]) The definition of small-scale installations in footnote 70 of the CEEAG refers to the definition contained in Article 5(2)(b) of Regulation (EU) 2019/943. Therefore, footnote 70 of the CEEAG applies with respect to small rooftop PV installations with a capacity of up to 400 kW.

(340) Therefore, the Commission considers that aid granted under the notified measures avoids undue negative effects on competition and trade.

3.3.3. Weighing up the positive and negative effects of the aid

(341) Point 134 of the CEEAG states that: "*Provided that all other compatibility conditions are met, the Commission will typically find that the balance for decarbonisation measures is positive (that is to say, distortions to the internal market are outweighed by positive effects) in the light of their contribution to climate change mitigation, which is defined as an environmental objective in Regulation (EU) 2020/852 and/or in light of their contribution to meeting Union energy and climate objectives, as long as there are no obvious indications of non-compliance with the 'do no significant harm' principle ([55]). In case the assumption above does not apply, the Commission will assess whether on balance the positive effects (including compliance with the points in Section 4.1.4 and any commitments related to point 129) outweigh the negative impacts on the internal market.*"

(342) The notified measures support the production of electricity from renewable energy sources (point 4.1 of the Taxonomy on environmental objectives for climate change mitigation and adaptation). No negative impact on taxonomy environmental objectives is expected. As noted in recital (228), where an environmental impact assessment or an assessment is required under Directive 2011/92/EU, it will be carried out (Annex D to the DA on climate change mitigation and adaptation of the taxonomy). Necessary corrective and compensatory measures and audits will be carried out.

(343) Therefore, the Commission concludes that the positive effects of the measure outweigh the negative effects on the internal market.

3.3.4. Companies in difficulty and under recovery order

(344) As explained in recital (223), Germany commits to not award aid under the notified measures to undertakings in difficulty as defined by the Commission Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty. ([56])

(345) As explained in recital (224), Germany has committed that no aid will be granted to undertakings subject to an outstanding recovery order following a previous Commission decision declaring aid illegal and incompatible with the internal market.

(346) Therefore, the Commission concludes that each of the notified measures complies with points 14 and 15 of the CEEAG.

([55]) For measures which are identical to measures within Recovery and Resilience Plans as approved by the Council, their compliance with the 'Do no significant harm' principle is considered fulfilled as this has already been verified.

([56]) Communication from the Commission – Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty (OJ C 249, 31.7.2014, p. 1).

3.3.5. Evaluation

(347) Point 76 and chapter 5 of the CEEAG state that the Commission may require that certain aid schemes be subject to an *ex post* evaluation, where the potential distortion of competition is particularly high, that is to say when the measure may risk significantly restricting or distorting competition if its implementation is not reviewed in due time. Point 456 of the CEEAG clarifies that *ex post* evaluation will be required for schemes with large aid budgets (exceeding EUR 150 million in any given year or EUR 750 million over the total duration of the scheme), or containing novel characteristics, or when significant market, technology or regulatory changes are foreseen.

(348) The present scheme fulfils the criteria of being a scheme with a large aid budget (see section 2.8) and containing novel characteristics (e.g. the regional measures for onshore wind, biomass and biomethane); therefore it will be subject to an *ex post* evaluation.

(349) Germany has notified an update of the evaluation plan, notified in the context of case SA.57779 (evaluating the EEG 2021), setting out the scope and modalities of the *ex post* evaluation. The plan is described in detail in section 2.14 of the decision in case SA.57779, and the updates are described in section 2.12 of the current decision. The evaluation will be jointly carried out for the EEG 2023 and the modified Offshore Wind Act (assessed in the decision in case SA.103069).

(350) Since the methodologies and data sources have not been changed compared to the evaluation plan submitted in the context of case SA.57779, the Commission refer to the assessment in the decision in case SA.57779.

(351) In the context of the EEG 2023, the Commission welcomes that the following specific features of the EEG 2023 are assessed:

(a) Regarding onshore wind projects in particular, Germany will assess the impact of the (modified) reference yield model (‘*Referenzertragmodel*’) on the outcome of the bidding process for onshore wind tenders;

(b) Regarding biomass and biomethane, Germany will assess the impact of the South quota on the competitiveness of the tenders and the impact on the overall system integration costs;

(c) Regarding all tendered support, Germany will assess the impact of the introduction of volume control mechanisms on the competitiveness of the tenders;

(d) Germany will analyse the effects of the aid in periods when electricity prices are negative (due to excessive supply or limited demand).

(352) The Commission notes that the evaluation will be conducted according to the notified evaluation plan by an independent evaluation body. Moreover, the envisaged publication of the evaluation plan and its results on a public website are adequate to ensure transparency.

(353) The Commission also notes that Germany plans to submit the final evaluation report when it becomes available (at the latest by the end of March 2026) and that

an interim evaluation report will be provided in the first half of 2024, which will update the Commission on the progress with data collection and the progress to apply the targeted methodologies mentioned above. In line with the principle of sincere cooperation, Germany commits to swiftly inform the Commission and jointly agree on a possible solution in case the methodologies foreseen in the evaluation plan cannot be applied (e.g. due to lack of data). No future similar scheme can be approved as long as the evaluation is not carried out, in sufficient quality, and its results taken fully into account in the design of any new scheme with similar objective.

(354) The Commission therefore considers that the notified evaluation plan meets the requirements of point 76 and chapter 5 of the CEEAG.

3.3.6. Conclusion on the compatibility of the notified measures

(355) The Commission concludes that the aid to be granted pursuant to each of the notified measures facilitates the development of an economic activity and does not adversely affect trading conditions to an extent contrary to the common interest. Therefore, the Commission considers the aid compatible with the internal market based on Article 107(3)(c) TFEU, as interpreted in the relevant provisions of the CEEAG.

4. AUTHENTIC LANGUAGE

(356) As mentioned in recital (2), Germany has exceptionally accepted to have the decision adopted and notified in English. The authentic language will therefore be English.

5. CONCLUSION

The Commission has accordingly decided not to raise objections to the aid on the grounds that it is compatible with the internal market pursuant to Article 107(3)(c) of the Treaty on the Functioning of the European Union.

Yours faithfully,

For the Commission

Margrethe VESTAGER
Executive Vice-President