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In the published version of this decision, some information has been omitted, pursuant to articles 30 and 31 of Council Regulation (EU) 2015/1589 of 13 July 2015 laying down detailed rules for the application of Article 108 of the Treaty on the Functioning of the European Union, concerning non-disclosure of information covered by professional secrecy. The omissions are shown thus […]		PUBLIC VERSION This document is made available for information purposes only.

Subject: **State Aid SA.56826 (2020/N) – Germany – 2020 reform of support for cogeneration**

State Aid SA.53308 (2019/N) – Germany – Change of support to existing CHP plants (§ 13 KWKG)

Excellency,

1. PROCEDURE

(1) The German authorities have notified two measures, both related to direct support for combined heat and power ("CHP"), and agreed for the cases to be joined and therefore to be assessed in one decision.

1.1. SA.56826 - 2020 reform of support for cogeneration

(2) Following pre-notification contacts, the German authorities notified to the Commission on 23 September 2020 amendments to the Combined Heat and Power Generation Act ("KWKG" or "KWKG 2020") which was adopted by the German Parliament on 21 December 2015 ("KWKG 2016"). The support granted under the KWKG 2016 was approved by the Commission in its decision in case

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SA.42393 (2016/C) (ex 2015/N) – Germany - Reform of support for cogeneration in Germany[1] ("the 2016 decision").

(3) The notified amendments to the KWKG 2016 and to the linked "*KWK-Ausschreibungsverordnung*" ("KWK-ordinance") were included in articles 7 and 8 of the "*Gesetz zur Reduzierung und zur Beendigung der Kohleverstromung und zur Änderung weiterer Gesetze (Kohleausstiegsgesetz)*" ("coal exit law") adopted on 8 August 2020, and were further amended by articles 17 and 18 of the "*Gesetz zur Änderung des Erneuerbare-Energien-Gesetzes*" ("EEG 2021") adopted on 21 December 2020. The notified reform of the KWKG does not include the measures mentioned in §35 (19) KWKG, which refers to planned award of support after the end of 2026 and the introduction of a national Power to Heat ("PtH") bonus and which would be subject to a separate notification.

(4) The Commission sent requests for information on 26 October 2020 and 19 January 2021. Germany submitted replies in October, November and December 2020, as well as in January and February 2021. The last replies from Germany were received on 8 April 2021.

(5) On 6 November 2020, Germany submitted an evaluation report of the KWKG 2016. During a video conference meeting on 3 December 2020, the European Commission informed Germany that the evaluation report of the KWKG 2016 could serve as an interim evaluation report of the KWKG 2020. On 26 February 2021, Germany submitted the final draft of the revised evaluation plan of the KWKG 2020.

(6) On 6 November 2020, Germany waived its right under Article 342 TFEU in conjunction with Article 3 of Council Regulation (EEC) No 1/1958 to have the decision adopted in German and agreed that the decision be adopted and notified in English.

(7) The Commission also received spontaneous submissions from third parties. The submissions of Greenpeace Energy and an anonymous party were forwarded to Germany for comments on 7 October 2020. Germany provided comments on these allegations of third parties on 3 December 2020.

(8) On 8 April 2021, Germany also notified the reduced CHP surcharge for hydrogen producers, as foreseen in § 27 of the KWKG 2020 with reference to § 63 (1)a in combination with § 64a of the EEG 2021.

1.2. SA.53308 - Change of support to existing CHP plants (§ 13 KWKG)

(9) On 28 January 2019, the German authorities notified to the Commission the amendment of the support for existing CHP plants under §13 KWKG through the "*Gesetz zur Änderung des Erneuerbare-Energien-Gesetzes, des Kraft-Wärme-Kopplungsgesetzes, des Energiewirtschaftsgesetzes und weiterer energierechtlicher Vorschriften*" (Energy Omnibus Act, hereinafter: "EnSaG"), which was adopted into law on 17 December 2018. It modified the KWKG 2016.

[1] Commission Decision in State aid SA.42393 (2016/C) (ex 2015/N) "Reform of support for cogeneration in Germany", OJ C 406, 04.11.2016.

(10) The initial support under §13 KWKG 2016, was approved by the Commission in the 2016 decision.

(11) The Commission sent requests for information on 6 February 2019, 1 and 22 March 2019 and 26 October 2020.

(12) Germany submitted replies in March 2019 and November 2020.

(13) As mentioned in recital (6), on 6 November 2020, Germany waived its right under Article 342 TFEU in conjunction with Article 3 of Council Regulation (EEC) No 1/1958 to have the decision adopted in German and agreed that the decision be adopted and notified in English. Moreover, Germany agreed that the Commission adopts one decision covering both cases SA.56826 and SA.53308.

2. DETAILED DESCRIPTION OF THE MEASURES

2.1. Overall objectives and legal basis

(14) The KWKG aims at improving the energy efficiency of energy production as well as the protection of climate and the environment, by increasing the net electricity production from combined heat and power generation ("CHP") installations to 120 TWh/year by 2025, as compared to the current yearly production of 115 TWh[2].

(15) In line with Article 14 (1) of the Energy Efficiency Directive[3], Germany published a new "*comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling*"[4].

(16) Many amendments to the KWKG are part of the coal exit law. The primary objective of the coal exit law is to end coal power generation and achieve the energy sector target of 175-183 Mt CO_2 equivalents by 2030. In this context, the notified amendments to the KWKG aim to encourage the transition to new or modernised gas-fired CHP plants and to promote electricity from high-efficiency CHP plants.

(17) The KWKG also aims at ensuring cohesion between support for CHP and the goals of the energy transition (*Energiewende*). The KWKG therefore also supports new heat/cooling storage facilities, as they increase the flexibility of cogeneration facilities, and focuses on installations that can reduce CO_2 emissions in the electricity sector. According to a 2020 study from the German environment agency[5], the annual CO_2 savings from cogeneration in Germany since 2012 are 10-20 million tonnes (average emission factor) and 40-54 million tonnes

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2 In 2017, the CHP production resulted in avoiding between 17 and 54 million tonnes of CO2 emissions, depending on assumptions regarding the reference values for uncoupled electricity and heat production (Prognos et al. 2019).

3 Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L315, 14.11.2012, p. 1).

4 https://www.bfee-online.de/SharedDocs/Kurzmeldungen/BfEE/DE/Effizienzpolitik/20200929_energieeffizienz_waerme.html

5 https://www.umweltbundesamt.de/publikationen/status-quo-der-kraft-waerme-kopplung-in-deutschland

(displacement mix), depending on the calculation method used. In addition, new coal-fired and lignite-fired CHP installations are not supported and support under the KWKG is essentially directed at gas-fired CHP installations as they have lower CO_2 emissions. Bio-energy CHP installations are also eligible for support under the KWKG but in general they ask for support under the Renewable Energy Sources Act ("EEG") under which higher support levels are possible.[6]

(18) To this aim, the KWKG 2020 foresees the following measures:

- Direct support to CHP:
  - General CHP-support (see recitals (20) to (69) below);
  - Support to innovative CHP (through tenders and a bonus) (see recitals (70) to (77) below);
  - Coal-switch bonus (see recitals (78) to (87) below).
- Support to heat and cooling storage facilities (see recitals (96) to (106) below);
- Support to district heating and cooling networks (see recitals (107) to (117) below);
- Reduction in CHP surcharge levied on hydrogen producers (see recitals (143) to (148) below).

(19) Moreover, the amendment of §13 KWKG reduced the support rates for existing CHP to avoid overcompensation (see recitals (88) to (95) below).

2.2. The support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations

2.2.1. The general CHP support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations

(20) Under the KWKG, support is granted to new, modernised and retrofitted highly efficient CHP installations. It is open to various cogeneration technologies (including gas and steam turbines, Organic Rankine Cycle and fuel cells).

(21) CHP installations qualify as highly efficient if they comply with the high-efficiency criteria of the Energy Efficiency Directive (see §2(8a) KWKG).

(22) CHP installations can be fired by biogas, biomass, natural gas, oil, waste and waste heat. The support level does not vary depending on the type of fuel used. As gas-fired CHP installations are the main focus of the KWKG, the support level

[6] According to §1(3) KWK, electricity production (not installations) which is already subsidised by the EEG is not eligible for the CHP support. Technically the same biomass plants could be supported from both the EEG and the KWKG for different amounts of produced electricity. So far, this possibility has not been used as hours eligible for support had not been limited for biomass installations in the past. Therefore, operators exclusively used the EEG. The new EEG (see Commission Decision in State aid SA.57779 (2020/N) "EEG 2021")) introduced a limit on the eligible hours hence operators could theoretically apply for support under the KWKG for the remaining part of electricity production. Germany committed to close this temporary legislative gap to rule out for the future that biomass installation receives support through both instruments.

has been set by reference to typical costs of gas-fired CHP installations. CHP installations using bio-energy were in practice supported under the EEG given that renewable support was higher than CHP-support. As to oil-fired CHP installations, Germany indicated that production costs for those installations are higher than for gas-fired CHP installations given that oil prices are significantly higher than gas prices (in 2020, 32 €/MWh for light oil compared to 11 €/MWh for natural gas). Concerning CHP installations burning waste, Germany explained that waste-fired CHP installations cannot use the most efficient CHP technology (GuD) but can only use steam processes, also the amount of electricity used by the CHP installation itself is higher than for gas-fired CHP installations (among others because it needs electricity to filter the waste gases). As a result, investment costs per installed kW are much higher for waste-fired CHP installations than for gas-fired CHP installations[7]. Germany further indicated that waste incineration businesses were as a rule subject to public procurement. Competition to obtain the waste incineration concession is generally high. As a result, the support for the CHP installation would also be integrated into the bid and any overcompensation can be excluded.

(23) The support is paid as a premium (the "general CHP-support") on top of the market price by the network operator to which the installation is connected.

(24) Operators of CHP installations with an electrical capacity of more than 100 kW have to sell their electricity on the market, i.e. to a third party or consume it themselves (see §4(1) KWKG). Operators of smaller CHP installations have the choice to sell the electricity on the market, consume it themselves or ask the network operator to buy it at an agreed price (see §4(2) KWKG). The purchase price will be the average price for base-load electricity on the EEX exchange of the previous trimester.

(25) Operators of CHP installations with a capacity above 100 kW are subject to balancing responsibilities like any other generator. Those responsibilities are laid down in the Electricity Grid Access Ordinance ("*Stromnetzzugangsverordnung – StromNZV*"[8]).

(26) The support is paid in principle for CHP electricity injected into the public grid for 30 000 full load hours as of the moment the installation entered into operation.

(27) The 2020 reform limits the eligible full load hours within a calendar year for all CHP plants which entered into operation after 31 December 2019 to 3 500 full load hours. In a transitional phase, the eligible full load hours for those installations will be gradually reduced (from a maximum of 5 000 from 2021 onwards to 4 000 from 2023 onwards and to 3 500 from 2025). Installations that

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7 See: https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/3445.pdf It can be seen from the specific costs and revenues per tonne of waste used (Figure 5-1, p. 85) that annual costs amount to around EUR 120/tonne for investment, operating and other costs (treatment costs for slag, ash, filter dust, etc.) while the electricity revenues only amount to EUR 15/tonne of waste.

8 According to section 4, paragraph 3 of the StromNZV, every feed-in point and every exit-point has to be part of a balancing group. Network users have to name a balancing responsible party for every balancing group. The balancing responsible party is responsible for the balance of feed-ins and draw-offs of electrical energy in every quarter of an hour in a balancing group and assumes the economic responsibility for deviations (section 4, paragraph 2, StromNZV).

entered into operation not later than 31 December 2019 are not subject to this change.

(28) Germany has explained that according to normal accounting rules the usual depreciation period of CHP installations is 20 years. CHP installations operate between 3 000 and 8 000 full load hours per year, depending on the size of the installation and the sector concerned. 30 000 full load hours would thus be reached at the latest after 10 years in the case of an installation running only during 3 000 full load hours/year.

(29) When the value of hour contracts is zero or negative on the EPEX Spot SE exchange in Paris (price zone Germany), no premium is paid out for the CHP electricity produced during those hours (see §7(5) KWKG). Before the notified reform, in the case of electricity production in hours with negative electricity prices, the payment of the CHP support was suspended and postponed to a later date. Under the notified reform, the quantities of CHP electricity produced during negative hourly contracts or zero values will not be eligible for CHP support. At the same time, the total amount of support will actually be reduced by the amount of electricity fed in at a time of negative prices. Installations with an electrical capacity not exceeding 50 kW will not be subject to this new rule.

(30) The operating aid for CHP installations under the KWKG can be cumulated with investment aid. However, in that case, the cumulation of the investment aid and the operating aid can never exceed the difference between the Levelised Cost of Electricity ("LCOE") produced in the CHP installation and the market price for the electricity. When the support is granted to beneficiaries selected in a tender (see section 2.2.1.1 below) and is cumulated with investment aid, Germany committed to deducting the investment aid previously received from the operating aid in line with point 151, read in conjunction with point 129 of the Guidelines on State aid for environmental protection and energy 2014-2020[9] ("EEAG").

(31) In the case of CHP installations, the payment responsibility rests on the distribution or transmission network operator to which the CHP installation is connected. The aid is paid out once the eligible installation enters into operation.

(32) Germany has further committed not to circumvent the waste hierarchy through the support to CHP installations. The waste hierarchy prioritizes the ways in which waste should be treated and consists of a) prevention, b) preparation for re-use, c) recycling, d) other recovery, for instance energy recovery and e) disposal.

2.2.1.1. General CHP support granted through tenders

(33) Support to CHP installations with an installed capacity between 500 kW and 50 MWel is granted only to operators selected in tenders, organised by the national regulator, the *Bundesnetzagentur* (see §8a (1) KWKG). Compared to the CHP scheme as approved in the 2016 decision, Germany decided to lower the tender participation threshold from 1 MW to 500 kW. Due to a transitional rule this applies only to installations between 500 kW and 1 MWel which entered into operation after 31st May 2021 (see § 35 (21) KWKG). Germany intends to extend

[9] OJ C 200, 28.6.2014, p. 1.

as soon as possible[10] this transitional rule to installations which the operator has ordered no later than 31st December 2020 and which enter into operation no later than 31st December 2022.

(34) The following CHP plants are not subject to the tender requirement and obtain the premium upon request directly on the basis of the KWKG (see section 2.2.1.2 below):

(a) CHP plants with an installed capacity equal to or smaller than 500 kWel;

(b) CHP plants with an installed capacity larger than 50 MWel; and

(c) Retrofitted CHP plants.

(35) Modernised CHP between 500kW and 50 MW can receive support through the tender if the cost of such a modernisation exceeds 50% of a complete new construction of the cogeneration plant and if the modernisation takes place at the earliest ten years after the first start of continuous operation of the plant or after the resumption of continuous operation of the already modernised plant (see recital (66) below). Such modernised installations are entitled to the same level of subsidy as new installations (i.e. for 30 000 full load hours) (see recital (67)).

(36) As to the scope of the beneficiaries, Germany submitted that participation in the tender is subject to the condition that the entire electricity produced in the CHP installation is injected into the public grid. Thus, if an operator who wins a tender will later self-consume energy produced by the CHP plant, he will lose the premium for the whole year in which the auto-consumption has taken place (see § 19(3) of the KWK-ordinance). Germany explained that self-consumed CHP electricity is eligible for a reduced EEG-surcharge[11] and that the premium loss aims at ensuring a level playing field between the different groups of CHP producers.

(37) In line with §11 (4), §25, §26 and §27 of the KWK-ordinance the CHP- support scheme is opened to imported CHP electricity through the participation of foreign operators in the tenders, on the basis of the following principles:

(a) Foreign installations can be selected up to 5% of the capacity of the tender;

(b) The payment of the premium is subject to physical imports of the electricity; physical imports can be demonstrated similarly to the way physical imports of renewable electricity can be demonstrated when foreign operators take part in tenders for the support of renewable electricity (see also § 5 EEG 2021);

(c) The support scheme is opened to installations located abroad in a non-discriminatory way;

(d) As regards local specifications and conditions (e.g. site restrictions, permission, grid connection etc.), the conditions of the country in which the installation is located apply (unless both countries agree differently);

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[10] According to current estimation by Germany, by summer 2021.

[11] See Commission Decisions in State aid SA.46526 (2017/N) "Reduced surcharge for self-generation under EEG 2017", OJ C 158, 04.05.2018 and SA.49522 (2017/N) "Reduced surcharge for cogeneration under EEG 2017", OJ C 406, 09.11.2018.

(e) The participation of an installation in another country in the opened tender is subject to a cooperation agreement being concluded with the Member State in which the foreign installation is located[12]; the following elements will be covered in that cooperation agreement:

i. Allocation of CO_2 emission reductions between the Member State who pays the support for the installation and the Member State where the generation takes place;

ii. The other Member State's agreement on technical issues regarding the installations built on its territory; such technical issues can be linked to grid connection and grid congestion management as well as requirements regarding the system integration of the power plants (e.g., market responsiveness – no must-run –, flexible operation, heat storage, remote control for flexible redispatch);

iii. The other Member State's agreement on the opening of the CHP-support scheme as such and on its scope.

(38) Concerning installations with an installed capacity of more than 50 MWel, Germany has explained that while support was needed to further incentivise the construction of that kind of installations which are indispensable to reach its CHP and energy efficiency targets, allowing their participation in the tenders risks undermining the competitiveness of the tenders; it also risks increasing the level of support as a result of possible strategic behaviour in the tender by operators of very large installations.

(39) In particular, Germany considers that the very small number of projects involving installations with a capacity above 50 MW is an obstacle to the expansion of the tender requirement for CHP above 50 MW. According to the Federal Office for Economic Affairs and Export Control's (BAFA) 2019 annual report (as at 31.07.2020), only 2 CHP installations over 50 MW started to operate on a permanent basis in 2017, none in 2018 and only 2 installations in 2019. Besides, the corresponding capacity also varied widely (in 2017: 182 MW in total; in 2018: 0 MW; in 2019: 295 MW), which would make it very difficult to determine a volume of tenders ex ante.

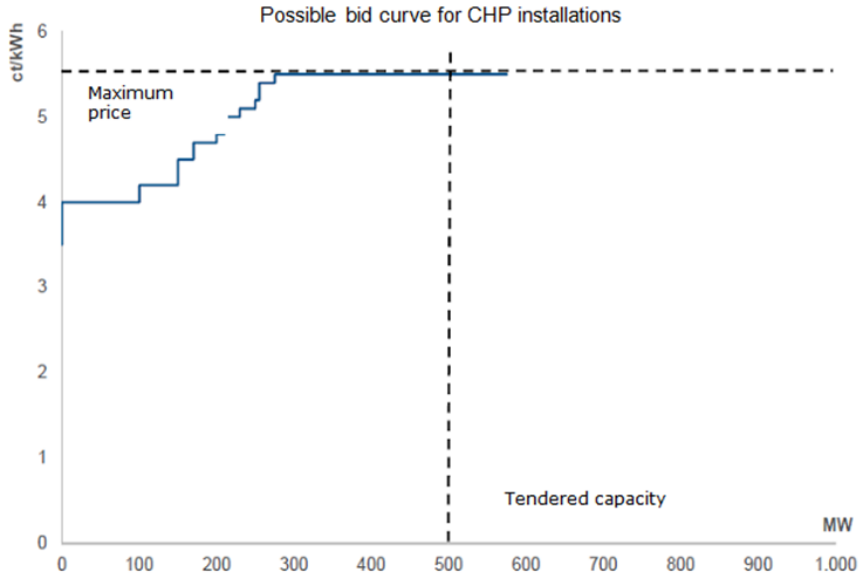
(40) Germany has further submitted information showing that installations of more than 50 MW benefit from economies of scale leading to lower LCOE. For instance, for the same type of installation (GuD), the LCOE of a 20 MW installation is more than double the LCOE of 450 MW installations. Germany is concerned that if only a limited number of larger installations participate in a tender, such installations may bid strategically slightly below the LCOE costs of smaller installations (instead of submitting a bid reflective of their costs). This would result in the larger projects winning the tender and making windfall profits.

(41) The following figure illustrates a hypothetical scenario in which all CHP plants above 1 MW are taken into consideration and the tendered capacity amounts to 500 MW, out of an estimated annual potential of around 575 MW (including larger projects). In that scenario, several smaller projects take part in the tender

[12] Germany indicates that, so far, no cooperation agreement has been concluded in the absence of any indication of interest from other Member States.

and bid at the level of their LCOE. However, it is likely that those small projects alone would not be sufficient to deliver the whole tendered capacity. Therefore, the only large project taking part in the tender will be needed to reach the tendered capacity. Germany considers that the results would be similar with the reduction of the tender threshold from 1 MW to 500 kW (see recital (33)).

Figure 1 - Hypothetical scenario for tenders for all CHP plants larger than 1 MW with only one large project bidding in the tender – source: notification file

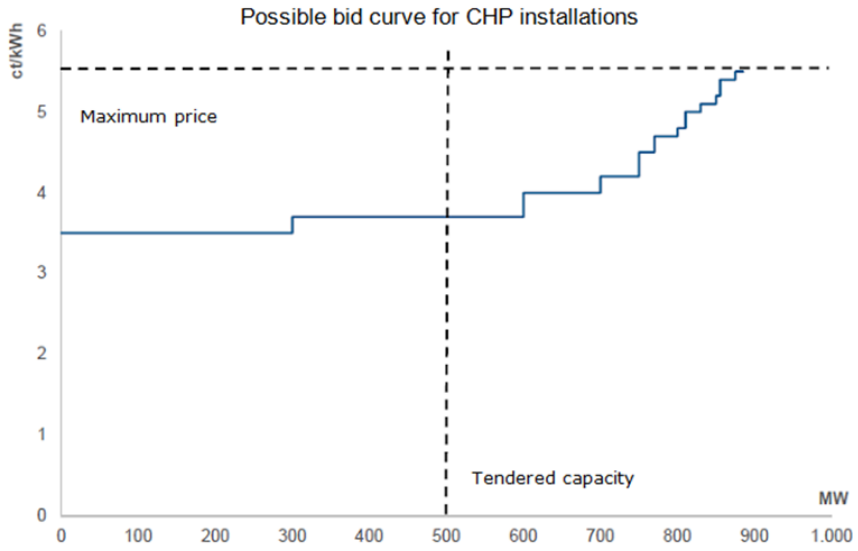


(42) If the large project is aware of the situation, it will be able to bid at a level that corresponds to costs of smaller projects, which is higher than its own costs, and nevertheless be selected.

(43) Furthermore, Germany has explained that larger project owners are in general better informed about other larger projects coming online soon (i.e., they have an asymmetric information advantage). First, part of the larger projects are developed by the same utilities; second, given their limited number and their knowledge of the sector, they are able to perceive more easily in which tender another larger project might participate or not. As a result, they would likely be aware that they will be the only larger project to participate in the tender. They might also know that their large project will be needed to fill the capacity tendered out.

(44) Germany has finally submitted that even if in a given year several larger projects participate, they would have an incentive to bid just slightly below the costs of the smaller projects. Short of eliminating all the smaller projects, this will result in windfall profits for the larger projects. Germany considers that the results would be similar with the reduction of the tender threshold from 1 MW to 500 kW (see recital (33).

Figure 2 - Hypothetical Scenario for tenders for all CHP plants larger than 1 MW with two larger project bidding in the tender- source: notification file



(45) Germany has explained that tendering out a more limited capacity does not solve the issue in the sense that it would have to be very limited to create sufficient competitive pressure on the larger installations to make them bid at their LCOE. But in that case, a likely outcome would be that the larger project decides not to take part in the tender in a given year (preferring to wait for a larger tender), resulting in an undersubscribed and thus uncompetitive tender. In addition, if Germany organises too small tenders, it will not reach its environmental objective of 120 TWh/a by 2025.

(46) Over the years, this could also discourage smaller projects to take part in tenders, as they will have experienced that they are likely to be eliminated if larger projects take part in the tender. Germany claims that this would further reduce the competitive tension in tenders, including in those years in which larger installations would not bid (which other participants would not know in advance).

(47) Also, according to Germany, organising separate tenders depending on the capacity of the installations would imply the risk that the tender for larger installations is not competitive enough due to the very small number of projects and the information advantage that project owners of larger project have (capacity to estimate in which tender they are likely to be the only bidders).

(48) As to retrofitted CHP installations, Germany has explained that those installations are not comparable to new and modernised CHP installations. Retrofitted installations get support for upgrading an existing uncoupled installation into a CHP one. This covers installations that previously were not CHP installations but have so far produced electricity or heat without combining the two processes. In practice, the retrofitting of CHP installations is an exceptional case. Since 2016, there have been only four cases of retrofitting.[13] There is thus not enough competition for organising specific tenders for retrofitted CHP installations. If

[13] Mannheim (support until 2016): 5,6 MWel; Oberhausen (2016-2018): 2,0 MWel; Zeitz (2016-2019): 5,6 MWel; Stendahl (2018-2019) 2,0 MWel.

retrofitted installations were to be bound to participate in tenders along with new installations, it is likely that these installations would gain significant windfall profits as the CHP-upgrade is in general far less costly than a new or modernised installation.

(49) The tenders are organised on a pay-as-bid basis, twice a year, on 1 June and 1 December. According to §8c KWKG, the annual volume of tenders under sections 2.2.1.1 and 2.2.2.1 of this decision is 200 MW. According to §3(2) of the KWK-ordinance, 150 MW are to be tendered each year until 2025 in the tenders for general CHP support.

(50) A bid cap of 7 cents/kWh is fixed in §5 of the KWK-ordinance. It has been determined on the basis of profitability calculations of typical CHP plants and systems. The profitability calculations were carried out independently of each other by two different research companies. For the tendering segment, several scenarios were examined to determine whether different maximum prices for typical CHP plants could lead, in a sufficient number of cases, to sufficient returns for competitive bids. To this end, the maximum possible returns of examples of CHP cases in the tendering segment (for new construction and modernisation projects) were calculated using the internal rate of return method. These cases included 1-50 MWel CHP plants in typical applications in the district heating sector and energy-intensive industries. The calculations took into account typical costs (investment, operation and fuels) and typical revenues from electricity and heat sales in different scenarios. The calculations used the same discount rates as those described in recitals (128) and following below. Based on the calculations, a bid cap of 7 cents/kWh has been chosen, as to allow competitive bids for a large number of cases and technological combinations, while at the same time preventing the possibility of very high bids.

(51) Contracts are awarded to all admissible bids, starting from the cheapest bid to the most expensive one, until the volume of the invitation to tender in question is no longer sufficient to award a contract to an offer in full (last offer in the volume of the invitation to tender). If the volume of the last bid exceeds by more than twice the remaining volume for that tender, this bid shall not be awarded and the previous bid shall constitute the upper limit. Otherwise, the last bid in the volume of the tender will constitute the award limit and will be awarded a contract. No award is granted to bids above the award limit (see §11 KWK-ordinance).

(52) Table 1 and Table 2 below present the results of the past tenders.

Table 1 – Overview of the bids in the tenders for CHP installations (source: notification)

	1. Round (01.12.2017)	**2. Round** (01.06.2018)	**3. Round** (03.12.2018)	**4. Round** (03.06.2019)	**5. Round** (02.12.2019)	**6. Round** (02.06.2020)	**7. Round** (01.12.2020)
Cheapest bid	3,19 ct/kWh	2,99 ct/kWh	3,49 ct/kWh	3,93 ct/kWh	3,40 ct/kWh	4,70 ct/kWh	5,60 ct/kWh
Highest bid	6,99 ct/kWh	5,20 ct/kWh	6,86 ct/kWh	6,98 ct/kWh	6,84 ct/kWh	7,00 ct/kWh	7,00 ct/kWh
Medium bid	5,16 ct/kWh	4,29 ct/kWh	5,08 ct/kWh	4,41 ct/kWh	5,03 ct/kWh	6,23 ct/kWh	6,72 ct/kWh
Number of bids	20	15	18	13	13	22	17
Volume of bids	225 MW	96 MW	126 MW	87 MW	58 MW	71 MW	60 MW

Modernised CHP plants	16 MW	15 MW	14 MW	29 MW	23 MW	26 MW	6 MW
Bids 1 to 10 MW	66 MW	71 MW	72 MW	40 MW	47 MW	71 MW	35 MW
Bids 10 to 20 MW	0	25 MW	11 MW	16 MW	11 MW	0	25 MW
Bids 20 to 30 MW	0	0	43 MW	0	0	0	0
Bids 30 to 40 MW	62 MW	0	0	32 MW	0	0	0
Bids 40 to 50 MW	98 MW	0	0	0	0	0	0
Exclusions	0	1	3	0	1	1	2

Table 2 – Overview of the awards in the tenders for CHP installations (source: notification)

	1. Round	**2. Round**	**3. Round**	**4. Round**	**5. Round**	**6. Round**	**7. Round**
	(01.12.2017)	(01.06.2018)	(03.12.2018)	(03.06.2019)	(02.12.2019)	(02.06.2020)	(01.12.2020)
Volume tendered	100 MW	93 MW	77 MW	51 MW	80 MW	75 MW	75 MW
Limit for the award	4,99 ct/kWh	volume not exhausted	5,24 ct/kWh	4 ct/kWh	volume not exhausted	volume not exhausted	volume not exhausted
Cheapest award	3,19 ct/kWh	2,99 ct/kWh	3,49 ct/kWh	3,93 ct/kWh	3,40 ct/kWh	4,70 ct/kWh	5,90 ct/kWh
Highest award	4,99 ct/kWh	5,20 ct/kWh	5,24 ct/kWh	4 ct/kWh	6,84 ct/kWh	7,00 ct/kWh	7,00 ct/kWh
Medium award	4,05 ct/kWh	4,31 ct/kWh	4,77 ct/kWh	3,95 ct/kWh	5,12 ct/kWh	6,22 ct/kWh	6,75 ct/kWh
Number of awards	7	14	12	4	12	21	15
Amount awarded	82 MW	91 MW	100 MW	46 MW	53 MW	69 MW	56 MW
Modernised CHP plants	16 MW	15 MW	4 MW	4 MW	23 MW	24 MW	4 MW
Awards 1 to 10 MW	20 MW	66 MW	46 MW	15 MW	42 MW	69 MW	31 MW
Awards 10 to 20 MW	0	25 MW	11 MW	0	11 MW	0	25 MW
Awards 20 to 30 MW	0	0	43 MW	0	0	0	0
Awards 30 to 40 MW	62 MW	0	0	32 MW	0	0	0
Awards 40 to 50 MW	0	0	0	0	0	0	0

(53) As can be seen from Table 2 (and Table 7 further below), some tenders were undersubscribed, with the volume of bids being lower than the volume tendered. Germany considers that part of this undersubscription is due to the uncertainty about the legal framework, some project holders waiting for the notified reform to enter into force before participating in tenders. To increase the competitiveness of the tenders in the future, as mentioned in recital (33) above, the notified reform of the KWKG lowers the tender participation threshold from 1 MW to 500 kW. According to the latest figures from the BAFA, an average of around 30 MW of CHP capacity per year was authorised in the size class 500 – 1000 kW in 2017-2019[14]. Assuming that this value remains and half of this quantity participate in the tender in the future, Germany considers that an additional demand of around 7-8 MW per tender can be expected.

(54) Furthermore, Germany has introduced in § 3 (5) and (6) of the KWK-ordinance a new provision according to which the volume of the CHP tender will automatically be reduced if two consecutive tenders are undersubscribed. In this case, the volume of the following tender will be reduced to the average subscription of the two last tenders minus 10%. In the case that, after such reduction has taken place, a following tender is oversubscribed, the volume for the following tender will be raised back to the regular amount. In the case that, after such reduction has taken place, two consecutive tenders are oversubscribed, the volume for the following tender will be raised by the amount by which the volume for the preceding tenders have been reduced, but by no more than 10 percent of the regular volume.

2.2.1.2. General CHP support not granted through tenders

(55) CHP installations which are not subject to the tender requirement (see recital (34)) may receive support directly under the KWKG in line with the provisions described in the present section 2.2.1.2.

(56) The beneficiaries are automatically entitled to support under the KWKG once all eligibility requirements of the KWKG are fulfilled. If they are fulfilled, the network operator concerned is obliged to pay out the support. Eligibility is verified by the BAFA upon request of the beneficiary. If all eligibility conditions are satisfied, the BAFA has to deliver a document confirming the eligibility (called a "*Zulassung*").

(57) The request submitted to the BAFA must contain the name and address of the operator, the description of the installation (installed capacity/size, fuel used, energy efficiency, costs), whether the electricity is injected into a public grid, date at which the installation entered into operation and more generally all information demonstrating that all eligibility conditions are met (including proof of compliance with high energy efficiency requirement).

(58) The request is in principle introduced only after the start of operation as eligibility conditions can only be verified when the installation is already in operation. Germany explained, however, that in case of complex projects, project owners would contact the BAFA in the planning phase and ask the BAFA to already

[14] https://www.bafa.de/SharedDocs/Downloads/DE/Energie/kwk_statistik_zulassungen_2009_2019.html

provide a view on whether eligibility criteria are met before engaging into the project. Also, operators can request a preliminary confirmation "Vorbescheid" for new CHP installations of more than 10 MW before they start building the installation. The granting of a Vorbescheid is possible only for CHP above 50 MW for modernised CHP, and for CHP above 10 MW for retrofitted CHP installations. The Vorbescheid already confirms to the operator the amount of the subsidy and its duration (§12 KWKG).

(59) When the CHP installation for which support is requested has an electric CHP capacity of more than 300 MW, the authorisation is issued only after Commission approval of the project (individual notification).

(60) The level of the subsidy is determined on the basis of the rates described in Table 3.

Table 3 - CHP-support for CHP electricity injected into the grid

Electric CHP capacity	Support for CHP electricity injected into the grid – **before** the reform	Support for CHP electricity injected into the grid – **after** the reform
	€ cent/kWh	€ cent/kWh
<=0.05 MW	8	16
> 0.05 and <=0.1 MW	6	6
> 0.1 and <=0.25 MW	5	5
> 0.25 and <=2 MW	4.4	4.4
> 2	3.1	3.4 [15]

(61) For two categories of operators support is also paid for the auto-consumed part of the electricity. Those are on the one hand operators of small CHP plants with an electrical capacity of up to 100 kW and on the other hand operators of CHP installations who qualify as electro-intensive users (EIU) eligible for a reduced EEG-surcharge under the EEG. In the latter case, the installation generally has a capacity above 100 kW. The CHP-support for those two categories is determined based on the rates described under Table 4.

Table 4 - CHP-support for auto-consumption

Electric CHP capacity	Small installations		EIU
	€ cent/kWh		€ cent/kWh
	Before the reform	After the reform	Before and after the reform
<=0.05 MW	4	8	5.41
> 0.05 and <=0.1 MW	3	3	4.00
> 0.1 and <=0.25 MW			4.00
> 0.25 and <=2 MW			2.40
> 2			1.80

[15] For new or modernised CHP plants only. For retrofitted CHP plants with a capacity above 2MW, the support remains at 3.1 € cent / kWh.

(62) Support is also paid to operators supplying CHP electricity to third parties but using a private network (industrial parks) if the supplied customer bears the full EEG-surcharge (§6(3)(2) KWKG). This also covers the situation of an operator (the "*Contractor*") supplying electricity to third parties from an installation located on the premises of the client. In that case, the installation could be providing energy to a single client and the *Contractor* is in charge of the construction, operation and maintenance of the installation. The CHP-support for that category of operators is calculated using the rates described in Table 5.

Table 5 - CHP-support for "Contractors"

Electric CHP capacity	Supply to third party outside public grid ("*Contractors*")	
	€ Cent/kWh	
	Before the reform	After the reform
<=0.05 MW	4	8
> 0.05 and <=0.1 MW	3	3
> 0.1 and <=0.25 MW	2	2
> 0.25 and <=2 MW	1.5	1.5
> 2	1	1

(63) In order to minimise the administrative burden for micro-cogeneration units, owners of CHP in the power range of up to 2 kW can receive their support payments as a flat one-time payment. This corresponds to a subsidy of 4 € cent/kWh multiplied by 60 000 full load hours

(64) With the notified reform of the support scheme, for CHP installations of less than 50 kW, the support will be adjusted in a revenue-neutral manner. The full load hours eligible for aid over the total period will be halved from 60 000 before the reform to 30 000 after the reform (alignment with other installations, see recital (26) above). In return, the level of support will be doubled, as shown in tables 3 to 5 above). The overall level of support therefore remains the same, but the support can be used more quickly. Otherwise, Germany feared that, because of the annual limitation of full load-hours (see recital (27) above), these installations would not be able to access the full support during their lifetime.

(65) The reform will increase the support for CHP installations of more than 2 MW by 0.5 cents/kWh from 1 January 2023 onwards: this increase will only apply to new CHP installations, and not to modernised or retrofitted ones (see recitals (66) and (68) below). According to Germany, as of 1 January 2023, newly built CHP installations will no longer have any revenue from so-called “payments for avoided network charges”[16]. This has a negative impact on the economic viability

[16] The payments for avoided network charges for decentralised injection into the grid were introduced in 1 January 2000 and are now regulated by § 18 of the Stromnetzentgeltverordnung. They were originally justified by the fact that electricity injected on a decentralised basis represent a lower burden on electricity networks and therefore lower network costs compared to injections from large power plants. This is because electricity injected in a decentralised way and consumed locally does not require transport at higher grid levels. In this case, distribution system operators save network charges to upstream network levels and pass this savings on to the decentralised operators as avoided network charges. It has become clear that this logic no longer works as

of the CHP plants concerned. The amendment aims at keeping investments in new CHP plants economically viable. In addition, a review clause was included under which the Federal Ministry of Economic Affairs and Energy will review in 2021 and 2022 whether and to what extent this increase in remuneration is appropriate and necessary and, if necessary, propose a legislative amendment to the German Bundestag. This is also an important element of the national evaluation plan. In case of implementation of the increase, Germany committed to demonstrate to the Commission by 30 June 2022 that it would not result in an overcompensation.

(66) Modernised installations are existing CHP plants where old system parts relevant to determine the efficiency of the installation are replaced with new components. If the cost of such a modernisation exceeds 10% of a complete new construction of the cogeneration plant, this modernised plant is eligible for support under the KWKG for 6 000 full load hours, if the modernisation takes place at the earliest two years after the first start of continuous operation of the plant or after the resumption of continuous operation of the already modernised plant and only if the plant is a "steam busbar CHP plant" ("*Dampfsammelschienen-KWK-Anlage*") with an electrical output of more than 50 MW. For other modernised CHP installations, if the cost of such a modernisation exceeds 25% of a completely new construction of the cogeneration plant, this modernised plant is eligible for support under the KWKG for 15 000 full load hours, if the modernisation takes place at the earliest five years after the first start of continuous operation of the plant or after the resumption of continuous operation of the already modernized plant. If the cost of such a modernisation exceeds 50% of a completely new construction of the cogeneration plant, this modernised plant is eligible for support under the KWKG for 30 000 full load hours, if the modernisation takes place at the earliest ten years after the first start of continuous operation of the plant or after the resumption of continuous operation of the already modernized plant (see §8(2) KWKG).

(67) Germany has explained that modernised CHP installations face higher operating costs than new CHP installations. Due to continuous technological progress, new installations will require less repair and maintenance costs and consume less fuel than modernised installations. Given that capital costs represent only 20 to 25% of total production costs of a CHP installation, once the modernisation costs reach a certain level (i.e. 50% of the costs of a new investment), the difference in capital costs compared to a new installation is outbalanced by additional operating costs of the modernised installation. For that reason, modernised installations are entitled to the same level of subsidy as new installations (i.e. for 30 000 full load hours) when modernisation costs represent more than 50% of the investment costs of a new installation. The CHP-support is determined on the basis of the rates described in Table 3 above.

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decentralised injection increases. The electricity injected in a decentralised way is increasingly being shipped to local consumers, but needs to be transported over upstream grid levels in an increasing number of cases. In order to respond to this new situation, the Netzentgeltmodernisierungsgesetz (NEMoG) decided in 2017 to phase out the avoided network charges and included corresponding provisions in § 120 of the Energiewirtschaftsgesetz. Thereafter, intermittent installations that were put into operation as from 1 January 2018 and non-intermittent installations put into operation as from 1 January 2023 will no longer receive payments for avoided network charges.

(68) Retrofitted installations are un-combined installations which are converted into CHP installations. They are eligible for support under §8(3) KWKG, if the costs of the retrofitting correspond to at least 10% of a new CHP installation with the same capacity. Depending on whether the costs of the retrofitting exceed 10%, 25% or 50% of a new CHP installation with the same capacity, the aid will be granted for 10 000, 15 000 or 30 000 full-load hours. The CHP-support for retrofitted installations will also be determined based on the rates in Table 3 above.

(69) The "ETS premium" (i.e. an additional premium of 0.3 € cent/kWh, which used to be granted under §7(4) of the KWKG 2016 for CHP facilities subject to the EU-ETS[17]) and is described in recital 27 of the 2016 decision, has been abolished by the EEG 2021.

2.2.2. Support to the production of electricity from innovative CHP systems

(70) "iKWK systems" (innovative CHP systems) are 'particularly energy-efficient and low greenhouse gas emission systems in which CHP plants, in combination with high shares of heat from renewable energy sources, produce or convert electricity and heat according to their needs' (see § 2(9a) KWKG). Renewable heat is innovative if it reaches an annual energy performance ratio[18] of at least 1.25 and is used outside the iKWK system (see §2(12) KWK-ordinance). The iKWK systems are supported either via tenders (see section 2.2.2.1) or via a bonus (see section 2.2.2.2).

2.2.2.1. iKWK tenders

(71) The innovative CHP ("iKWK") tenders are organised by the national regulator on a pay-as-bid basis, twice a year, on 1 June and 1 December. Each year 50 MW are tendered by the BNetzA. Only CHP with a capacity above 1 MW but below 10 MW can participate. In principle, it is possible for every CHP installation to participate in the tendering process. However, if later on such installation does not meet the minimum requirement that 35% of reference heat is produced by innovative renewable heat, the premium will be reduced (see §19(5) KWK-ordinance). If this happens for five years in a row no premium will be granted for the future (see §16(1)(6) KWK-ordinance).

(72) The provisions mentioned in recitals (23) to (32) above equally apply to iKWK tenders.

(73) A bid cap of 12 cents/kWh is fixed in §5 of the KWK-ordinance. The need for support has been examined in order to allow for broad technological diversity. In addition to the costs and revenues of the CHP plant (see recital (50) above), account was also taken of the additional necessary components with different technological compositions. The calculations used the same discount rates as

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17 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ L 275, 25.10.2003, p. 32.

18 The energy performance ratio (Jahresarbeitszahl or JAZ) is a measure of efficiency and is defined as the ratio of produced heat (output) and used electricity (input), both being measured in kilowatt hours per year.

those described in recitals (128) and following. Based on the calculations, a bid cap of 12 cents/kWh has been chosen, as to allow competitive bids for a large number of cases and technological combinations, while at the same time preventing the possibility of very high bids.

(74) The results of past innovative CHP tenders are presented below in Table 6 and Table 7.

Table 6 - Overview of the bids in the innovative CHP tenders (source: notification)

	1. Round (01.06.2018)	**2. Round** (03.12.2018)	**3. Round** (03.06.2019)	**4. Round** (02.12.2019)	**5. Round** (02.06.2020)	**6. Round** (01.12.2020)
Lowest bid	6,50 ct/kWh	7,99 ct/kWh	9,70 ct/kWh	8,78 ct/kWh	9,50 ct/kWh	9,95 ct/kWh
Highest bid	10,94 ct/kWh	11,97 ct/kWh	11,89 ct/kWh	11,92 ct/kWh	11,99 ct/kWh	11,99 ct/kWh
Average bid	9,98 ct/kWh	11,31 ct/kWh	11,17 ct/kWh	10,35 ct/kWh	10,63 ct/kWh	10,93 ct/kWh
Number of bids	7	3	5	10	13	11
Volume of bids	23 MW	13 MW	22 MW	43 MW	44 MW	31 MW
Modernised CHP plants	2 MW	0 MW	0 MW	0 MW	3 MW	8 MW
Exclusions	2	0	0	1	1	1

Table 7 - Overview of the awards in the innovative CHP tenders (source: notification)

	1. Round	**2. Round**	**3. Round**	**4. Round**	**5. Round**	**6. Round**
	(01.06.2018)	(03.12.2018)	(03.06.2019)	(02.12.2019)	(02.06.2020)	(01.12.2020)
Volume tendered	25 MW	29 MW	30 MW	25 MW	29 MW	28 MW
Award limit	volume not exhausted	volume not exhausted	volume not exhausted	11,20 ct/kWh	10,98 ct/kWh	11,99 ct/kWh
Cheapest Value of the award	8,47 ct/kWh	7,99 ct/kWh	9,70 ct/kWh	9,38 ct/kWh	9,50 ct/kWh	9,95 ct/kWh
Maximum value of the award	10,94 ct/kWh	11,97 ct/kWh	11,89 ct/kWh	11,20 ct/kWh	10,98 ct/kWh	11,99 ct/kWh
Average value of the award	10,27 ct/kWh	11,31 ct/kWh	11,17 ct/kWh	10,25 ct/kWh	10,22 ct/kWh	10,80 ct/kWh
Number of awards	5	3	5	5	8	10
Amount awarded	21 MW	13 MW	22 MW	20 MW	26 MW	27 MW
Modernised CHP plants	2 MW	0 MW	0 MW	0 MW	0 MW	0 MW

2.2.2.2. Innovative RES heat bonus

(75) According to Germany, previous general CHP tenders have shown that between 10 and 50 MW, there were very few bids (1 to maximum 4 per bidding round) and few different bidders. Germany assumes that this bidding structure also applies in principle to iKWK tenders. In addition, Germany considers that not all bidders in the 10-50 MW segment would also choose the iKWK tenders because the "iKWK capability" depends on the availability of RES at the site. The larger the underlying iKWK plant, the more difficult it is to reconcile the minimum amount of renewable heat required, e.g. with the land available for solar thermal energy. For the above reasons, Germany takes the view that the very small number of projects would result in an insufficient level of competition in the plant segment > 10 MW, for the time being. However, building on the experience gathered with the new innovative RES heat bonus, in the 2022 national evaluation, Germany will examine whether the innovative RES heat bonus could also be tendered for CHP with a capacity above 10 MW.

(76) In the meantime, for CHP installations with a capacity above 10 MW, which meet the definition of "iKWK system" in line with recital (70), Germany decided to create an "innovative RES heat bonus". This bonus is only available to CHP installations which also receive the general CHP support in line with sections 2.2.1.1 or 2.2.1.2.

(77) The aim of this bonus is to increase the flexibility and system relevance as well as the decarbonisation effects of cogeneration as a whole. The bonus covers the additional costs of setting up and operating innovative renewable heat generators in iKWK systems compared to conventional heat production. The level of the bonus is proportionate to the share of innovative renewable heat in the CHP system, starting with a minimum of 5% up to a maximum of 50%, as shown in Table 8.

Table 8 – Level of innovative RES heat bonus – source: notification file

% of innovative RES heat	5	10	15	20	25	30	35	40	45	50
Bonus in € cent /kWh	0,4	0,8	1,2	1,8	2,3	3	3,8	4,7	5,7	7

2.2.3. Coal switch bonus

(78) As described in recital 27 of the 2016 decision, in order to incentivise CHP plant owners to replace their existing coal-fired or lignite-fired plant with a gas-fired installation, a bonus of € 0.6 cents/kWh over the entire funding period (coal switch bonus) was provided to operators for the part of the cogeneration electricity capacity of the installation that was replacing an existing coal-fired or lignite-fired CHP installation. The operator had to demonstrate that the coal-fired or lignite-fired CHP installation had been closed within 12 months after the new installation started operation but at the earliest after 1 January 2016, he had to also demonstrate that he owned both installations or that they were feeding the

same heating network. In July 2020, Germany indicated that, since 2016, there had been 5 confirmations of eligibility ("*Zulassungen*") for a total of 268 MW and 14 preliminary confirmations ("*Vorbescheide*") for a total of 777 MW.

(79) The reform notified by Germany profoundly modifies this bonus. Operators of new CHP installations are now entitled to the coal switch bonus if they receive support in line with sections 2.2.1.1, 2.2.1.2 or 2.2.2.1 of this decision, and if the new CHP installation or the iKWK system replaces an existing CHP plant, which produces electricity from coal or lignite and which was put into operation for the first time after 31 December 1974. Replacement takes place if the new CHP plant feeds into the same heat network as the existing one and if the existing CHP plant[19] is definitively closed within twelve months before or after the start of the continuous operation of the new CHP plant, but not earlier than 1 January 2016. The new CHP plant replacing the electrical cogeneration capacity of an existing CHP plant does not need to be built on the same site. Germany indicates that a CHP operator which has already started receiving the previous form of coal switch bonus (as described in recital (78)) cannot receive the new one (see §35 (17) first sentence KWKG).

(80) With the reform of the KWKG, the coal switch bonus is converted into a capacity bonus, differentiated and digressive according to the age of the plant. The coal switch bonus now reflects the different economic situation of the coal-fired CHP installations to be replaced, to encourage early closure. For this purpose, the plants are divided into four age cohorts. The amount of the bonus is based on the foregone profits (from electricity and heat production) resulting from the early closure of the existing coal CHP plant. Like the foregone profits, the bonus decreases in steps, in line with Table 9.

Table 9 – New levels of the coal switch bonus – source: notification file

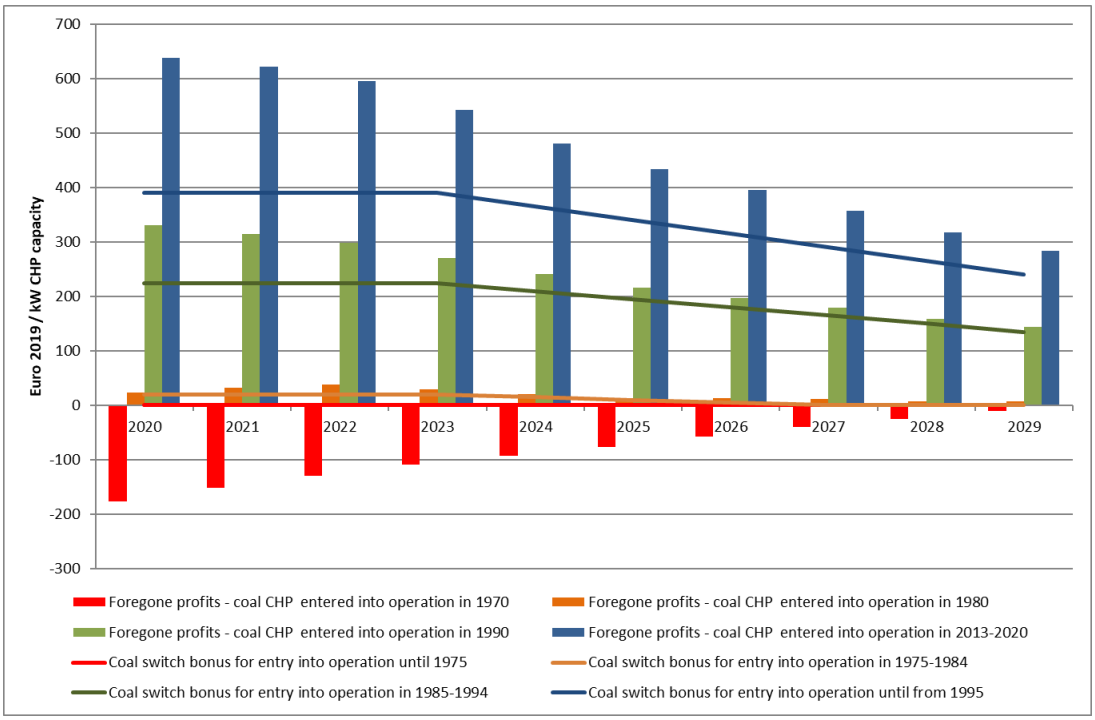
Initial commissioning of the existing CHP installation		Start of permanent operation of the new CHP installations by							
from	until	31.12.22.	31.12.23.	31.12.24.	31.12.25.	31.12.26.	31.12.27.	31.12.28.	31.12.29.
		In Euro per kW CHP capacity							
	31.12.74.	0	0	0	0	0	0	0	0
01.01.75.	31.12.84.	20	20	15	10	5	0	0	0
01.01.85.	31.12.94.	225	225	210	195	180	165	150	135
01.01.95.		390	390	365	340	315	290	265	240

(81) Figure 3 below shows the comparison between the estimated foregone profits of hard coal-fired CHP installations and the levels of the new coal-switch bonus. Germany submitted detailed calculations of the foregone profits. In the calculations of the forgone profits provided by Germany, it is assumed that the

[19] In the case of "Dampfsammelschienen-KWK-Anlagen" with an electrical capacity of more than 50 MW, the replacement of an existing steam generator producing steam from coal or lignite is to be treated as a replacement of an existing CHP plant. In such cases, the coal switch bonus is only granted for the part of the CHP electrical capacity corresponding to the share of the replaced steam generator in relation to the sum of all steam generators in the existing CHP plant.

CHP capacity of the installations represent 60% of their total electrical capacity[20]. The calculations of the foregone profits take into account the increasing cost of CO2 emissions, by applying the CO2 prices (EU-ETS and national CO2 price) as shown in Table 19 below. A discount rate of 6% was used[21].

Figure 3 – Comparison of the foregone profits of hard coal-fired CHP installations for a decommissioning by 31 December of the respective year with the level of the associated coal-switch bonus – source: notification file



(82) As regards lignite-fired CHP installations, Germany explains that they face lower costs compared to hard coal fired CHP ones, as shown in Table 12 below. With this table, Germany explains that lignite-fired and hard coal fired CHP installations have approximately the same electrical efficiency factors and that the smaller and the older the CHP installations, the lower the electrical efficiency factor, in general. Table 10 and Table 11 below present the assumptions used by Germany in Table 12.

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20 The coal switch bonus compensates for the foregone revenues of the CHP plant, which usually generates both coupled and uncoupled electricity. However, the coal switch bonus is attributed on the basis of the electrical CHP capacity of the existing coal-fired CHP plant. The electrical CHP capacity of an installation (with maximum heat recovery) is significantly lower than the maximum electrical capacity of the cogeneration unit, as it is only the part of the capacity that is directly related to the maximum amount of useful heat that can be disconnected in the cogeneration process. If only the profits of this part of the installation are included, the profit situation of the installation is clearly underestimated in the counterfactual scenario of continued operation. For this reason, the calculations assume that the CHP power accounts for 60 % of the electrical output. There is no official data source on the distribution of CHP shares among CHP plants. According to Germany, the 60 % is a mean estimate based on the work and professional expertise of research institutes. Accordingly, the foregone profits of the electrical CHP capacity are increased by 66%.

21 Germany explains that the normal market rate of return in the field of district heating is generally between 6 and 8 % (see also the evaluation report Fraunhofer et al. (2019), p. 57). The lower value of this range has been used to assess the foregone profits of existing coal-fired CHP plants since, compared to new investments, there are lower project risks (no risk of building cost increases or delays in completion). Therefore, the risk assessment is likely to be low.

Table 10 – Assumptions on variable costs – source: notification file

Variable cost item	Level
CO_2-allowance price[22]	28 EUR/t
Price of lignite	5 EUR/MWh
Price of hard coal	10 EUR/MWh
Emission factor of hard coal	0,336 t/MWh
Emission factor of lignite	0,400 t/MWh

Table 11 – Assumptions on fixed operating costs

Electrical efficiency factor	*Full load hours – lignite (in hours/year)*	*Full load hours – hard coal (in hours/year)*	*Fixed operating costs – lignite (EUR/kW/year)*	*Fixed operating costs – hard coal (EUR/kW/year)*	**Fixed operating costs – lignite (EUR/MWh)**	**Fixed operating costs – hard coal (EUR/MWh)**
15%	*4000*	*2000*	*50*	*40*	**13**	**20**
20%	*4000*	*2000*	*50*	*40*	**13**	**20**
25%	*4000*	*2000*	*50*	*40*	**13**	**20**
30%	*4500*	*2500*	*45*	*35*	**10**	**14**
35%	*4500*	*2500*	*45*	*35*	**10**	**14**
40%	*5000*	*3000*	*40*	*30*	**8**	**10**
45%	*5000*	*3000*	*40*	*30*	**8**	**10**

Table 12 – Costs of electrical production – source: notification file

	Costs of electrical production EUR/MWh el.[23]		**Difference in costs between lignite and hard coal**
Electrical efficiency factor	Lignite plant	Hard coal plant	
15%	121	149	-29
20%	94	117	-24
25%	77	98	-20
30%	64	79	-15
35%	56	69	-13
40%	49	59	-10
45%	44	53	-9

(83) Based on Table 12, Germany indicates that lignite-fired CHP plants face lower costs for electrical production and therefore have higher foregone profits, compared to hard coal-fired CHP plants. Consequently, Germany explains that the levels of the coal switch bonus shown in Table 9 are lower than the foregone profits of lignite-fired CHP plants.

[22] According to BNetzA's list of power plants, the smallest lignite-fired power plant covered has an electrical capacity of 9 MW. This corresponds to the rated thermal input exceeding 20 MW (20 MW thermal capacity x 0.45 electrical efficiency of large modern lignite power plants = 9 MW) and the power plant is hence subject to the EU ETS. Therefore, in the assumptions, Germany used the highest EU-ETS price corresponding to the year 2026 (see recital (81) and Table 19).

[23] Without capital costs.

(84) Germany indicates that, without the new coal switch bonus, hard coal- and lignite-fired CHP would continue operating since their operators would otherwise face high foregone profits. Since coal-fired CHP installations emit more greenhouse gases than CHP supported via the general CHP support (see recital (22)), the new coal switch bonus participates in the decarbonisation of the electricity and heat sectors. As regards the tendering segment (i.e. CHP installations between 500 kW and 50 MW, see section 2.2.1.1), Germany indicates that operators of coal CHP plants would not be selected in the tender if they priced their foregone profits in their bids. Therefore, without the new coal switch bonus, they would continue operating coal-fired CHP plants instead of building a new less-emitting CHP plant.

(85) Compared to the situation in 2016, when the first version of the coal-switch bonus was approved under State aid law (see recital (78)), Germany has put in place two mechanisms to foster the phase-out of coal-fired power plants. To phase-out hard coal powered electricity generation and small lignite installations[24], Germany introduced a tender mechanism[25]. For bigger lignite powered electricity generation, the phase-out and the compensation are elaborated through a negotiated procedure between the German government and the operators[26]. In accordance with §12 (1) number 6 and §46 of the coal phase-out law, operators which have been granted aid through either the tender mechanism or the negotiated procedure cannot receive the coal switch bonus.

(86) Nevertheless, Germany explains that the tender mechanism and the negotiated procedure to phase out coal mentioned in recital (84) are not adequate for some coal-fired CHP installations. For example, Germany indicates that some CHP plants have a closure delay of several years because, to ensure the continuous provision of heat, a closing CHP plant needs to be replaced by a new one in the same heating network. This delay is longer than the closing delay in the tender mechanism. Rather than having to run the old coal-fired CHP and the new CHP in parallel for some time and running the risk of not being selected in the tender, the owner would rather continue operating only the coal-fired CHP plant. To ensure that the coal-switch bonus is limited to CHP installations facing a significant heat constraint, the bonus is only available to installations with a cogeneration electrical share of at least 10% of the total electrical capacity of the installation[27].

(87) Furthermore, to limit any "arbitrage" with the tender mechanism for coal-phase out mentioned in recital (84), the coal switch bonus is only available to coal fired CHP plants whose operator has not submitted a bid in such tender after 31 May 2021. A cut-off date was chosen in order not to "penalise" coal-fired CHP who

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24 Lignite plants with a net capacity of less than 150 MW.

25 See Commission Decision in State aid SA.58181 (2020/N) "Tender mechanism for the phase-out of hard coal in Germany", OJ C 41, 05.02.2021.

26 See Commission Decision in State aid SA.53625 (2020/N) "Germany – Lignite phase-out", in publication.

27 Germany explains that the rate of 60% used to estimate the foregone revenues (see recital (76)) corresponds to a medium value, based on estimates. Germany considers that the rate of 10% referred to in recital (85) corresponds to a threshold set for an exclusion criterion below which it can be assumed that cogeneration is not essential for the power plant. As the impact (exclusion from the bonus) is drastic, Germany has chosen a low threshold in order to avoid undue hardship.

participated in coal-phase out tenders before that date not knowing that this would make them ineligible for the coal-switch bonus in the future.

2.3. Support to the production of CHP electricity in existing (depreciated) highly efficient gas-fired CHP installations in the district heating sector (§ 13 KWKG)

(88) Germany notified a change of the modalities of the support to existing (depreciated) highly efficient gas-fired CHP installations in the district heating sector through an amendment contained in the EnSaG (level of feed-in premium and groups of representative installations). The rationale for this support measure, as well as the detailed changes through the EnSaG are set out below (sections 2.3.1 and 2.3.2 respectively).

2.3.1. Rationale for the support to the production of CHP electricity in (depreciated) highly efficient gas-fired existing CHP plants in the district heating sector before 2019

(89) The 2016 decision concluded that depreciated gas-fired plants used for district heating could still technically be operated but could not generate sufficient revenue from the market alone under current market conditions. District heating companies typically operate both CHP installations and heat boilers to cover the heat demand. The companies are equipped with software that continuously verifies which combination of those installations will deliver the heat at the lowest cost. When electricity prices are low, production costs of CHP installations are higher than production costs of heat boilers; in those cases the heat boilers are used by preference to CHP installations for the heat production.

(90) In order to maintain the production level of existing installations in the district heating sector and possibly bring it back to a previous level of 20 to 22 TWh/year, Germany granted support to existing gas-fired CHP installations in the district heating sector until December 2019, in line with the 2016 decision.

(91) Germany has estimated that the support to existing installations would increase the number of operating hours of the installations concerned and in some cases, also prevent that the installation is closed altogether, compared to a situation without any support. Germany submitted that the support would increase the number of operating hours per year by between 300 and 1000. Under §13 of the KWKG 2016, operators of existing (depreciated) high-efficient gas-fired CHP plants with an electrical CHP capacity of more than 2 MW could obtain a support of 1.5 € cents/kWh if i) the CHP electricity was injected into the public grid, ii) the installation was in general used for public supply and iii) the electricity was not supported anymore under the EEG or under other provisions of the KWKG. The support was limited in time (31 December 2019) and full-load hours (up to 16 000 overall and 4 000 per year). The support was paid as a premium on top of the market price by the network operator to which the installation was connected.

2.3.2. Adjusted CHP-support under §13 of KWKG2016 as amended by EnSaG

(92) The provisions mentioned in recitals (23) to (25) and (29) to (32) apply *mutatis mutandis* to the adjusted CHP support as described in the present section.

(93) A study[28] issued for the German Ministry of Economy and Energy concluded that the applied level of fixed premium would lead to overcompensation for the years 2018 and 2019 for three out of five of the installation types, which were used as reference in the 2016 decision. In line with the monitoring obligation described in recital (140) below Germany amended §13 of KWKG2016 through article 2. Nr. 10 of the EnSaG. The overcompensation occurred mainly due to the decreasing prices for natural gas, but also due to increasing electricity wholesale market prices.

(94) The amendment adjusted the fixed premia for 2019 in a way to remove overcompensation for both the years 2018 and 2019, i.e. premia for 2019 were reduced sufficiently to also recoup the overcompensation for 2018. The modified premia applied both to existing (depreciated) plants receiving aid before the amendment, as well as to new requests by existing (depreciated) plants. Moreover, the amendment created several categories of existing CHP installations by size of the installations, which received distinct premia. The below Table 1 summarizes the adjusted system.

Table 13 – Adjusted fixed premia for 2019, by size of the existing (depreciated) CHP installation

Installation size (in MW)	2-50	51-100	101-200	201-300	>300
Premium (in € ct/kWh)	1.5	1.3	0.5	0.3	0

(95) The new categories and fixed premia were applied as of 1 January 2019 and until 31 December 2019 (i.e. before the end of the support to existing CHP installations).

(96) Moreover, cumulation with investment aid has been excluded by the EnSaG (Art. 2 Nr. 10 b) modifying §13(3) 2nd sentence of KWKG 2016). In addition, further amendments of § 13 KWKG by the EnSaG clarified that the aid for depreciated CHP plants only apply to such operators, which generally almost entirely inject the electricity produced into the public grid and do not self-consume any relevant share of the produced electricity or heat, in line with Commission Decision in case SA.42393.[29]

2.4. Support to heat and cooling storage facilities

(97) §§ 22-25 of the KWKG provide for investment support for the building of new heat or cooling storage facilities. This support was approved in the 2016 decision. Germany wants to prolong it until 31 December 2026.

(98) While aid under the KWKG can also be granted when the owner of the storage and the CHP installations are different, Germany has indicated that storage facilities generally belong to the owner of the CHP installation to which it is connected. Storage facilities hence do not generate self-standing revenues. In addition, the increased flexibility of the CHP installation connected to the storage

[28] Bericht "Überprüfung der Zuschlagszahlungen für Kraft-Wärme-Kopplungsanlagen 2017", prognos, 19 October 2017.

[29] See footnote 16 in Commission Decision in State aid SA.42393 (2016/C) (ex 2015/N) "Reform of support for cogeneration in Germany", OJ C 406, 04.11.2016.

facility does not yield enough additional revenues for the CHP installation to trigger the investment into the storage facility.

(99) Germany would like to generalise the use of heat/cooling storage facilities in connection to CHP installations. Germany views those storage facilities as key elements to increase the energy efficiency and integration of CHP installations into the electricity market. As the heat/cold can be stored more easily than electricity (in the form of warm/cold water), CHP installations connected to storage facilities can adapt their production to produce in particular at times of higher electricity demand instead of cogenerating the electricity when there is heat demand but not necessarily electricity demand. A later heat requirement can then be covered from the storage facility. This flexibility allows CHP installations to run for an increased number of operating hours. Indeed, when electricity prices are too low, the heat demand is by preference produced from heat boilers and the CHP installation is not used or its production is reduced. The flexibility induced by the storage facility has therefore a direct environmental impact: the increased operation of CHP installations displaces separate production in heat boilers. In addition, in Germany, CHP electricity produced at times of high electricity demand displaces coal-fired electricity generation and thus significantly reduces CO_2 emissions linked to electricity production. Finally, the induced flexibility also improves the integration of CHP installations into the electricity market as the electricity will be produced more in line with electricity demand.

(100) In addition, storage facilities can also be filled with waste heat and renewable heat. As this type of heat is not necessarily produced when it is needed, the storage facility will increase the use of waste heat and renewable heat and reduce the need for heat only boilers.

(101) Storage facilities are eligible for aid if the storage facility is mainly filled with heat produced by a CHP installation that is connected to the public electricity grid. Industrial waste heat and renewable heat are assimilated to CHP heat provided that the CHP heat still corresponds to at least 25% of the stored heat. The storage facility must have a capacity of at least 1 m³ of water equivalent or 0.3 m³ per kW installed electrical capacity.

(102) The aid amounts to 250 €/m³ water equivalent of the storage volume when the storage volume does not exceed 50 m³ water equivalent. This results in a maximum aid amount for small storage facilities of EUR 12 500. If it exceeds 50 m³ water equivalent, the aid is limited to 30% of the eligible investment costs. In total the aid may not exceed EUR 10 million per project.

(103) Eligible costs are all costs related to the construction of the storage facility and resulting from services and goods delivered by third parties. Not eligible are: administrative fees, internal costs for the construction and planning, imputed costs ("*kalkulatorische Kosten*"), costs related to insurances, financing and land acquisition.

(104) Germany has submitted an example of a concrete project for retrofitting a decommissioned oil tank into a heat storage installation. Its capacity would amount to 5000m³ and project costs are estimated to amount to EUR 2 million. The example shows that the aid makes it possible to increase the internal rate of return of the project from 5% to 11%. With only 5% projected internal rate of return the project would not have been implemented.

(105) In the case of storage facilities the responsibility to pay the aid rests on the transmission system operator ("TSO") to which the main CHP installation that feeds into the storage facility concerned is connected. The aid is paid out once the eligible installation enters into operation.

(106) The procedure described in recital (55) to (58) above are also applicable to heat and cooling storage facilities. In addition, Germany committed to verifying the incentive effect of the aid by requesting that the project owner also presents the counterfactual situation in the absence of aid. A *Vorbescheid* can also be requested for heat/cooling storage facilities when project costs exceed EUR 5 million (see §24(6) KWKG).

(107) Aid for storage facilities under the KWKG 2020 can be cumulated with aid from local authorities, the Länder or other federal aid schemes. It is in principle deducted from the aid granted under the KWKG 2020 except if cumulation has been explicitly authorised. In that case Germany has committed to verifying that the cumulated aid would not exceed the aid intensity authorised under Annex 1 of the EEAG for cogeneration installations[30].

2.5. Support to district heating/cooling networks

(108) Under §§18-21 KWKG support is granted for the construction and expansion of energy-efficient district heating/cooling networks (i.e. networks for the public supply of heat and/or cooling).

(109) The notified reform changes the conditions for the promotion of heat networks. Until now, the support was limited to heat networks, which either contain at least a 75% share of CHP or at least a 50% share of CHP heat, RES heat and waste heat combined. The new rules will increase the minimum requirement for the combination of sources to 75%. So far, support has been possible, for example, with 49% CHP heat in combination with 1 % waste heat and thus still 50% uncoupled fossil heat in the grid. Germany considers that this was not appropriate compared to the variant with 75% CHP heat and a lower share of 25% uncoupled fossil heat. By aligning the minimum requirement, this wrong incentive will be avoided and a lower, maximum content of 25% fossil uncoupled heat will be set.

(110) In the case of district heating/cooling networks the responsibility to pay the support rests on the TSO, to which the main CHP installation that feeds heat/cooling into the district heating/cooling network or the storage facility concerned is connected. The aid is paid out once the eligible network enters into operation.

(111) The procedures described in recital (55) to (58) above are also applicable to district heating and cooling networks. In addition, Germany committed to verifying the incentive effect of the aid by requesting that the project owner also presents the counterfactual situation in the absence of aid. A *Vorbescheid* can also

[30] Annex 1 to the EEAG provide for the following aid intensities in the case of cogeneration installations: 65% for small enterprises, 55% for medium-sized enterprises, 45% for large enterprises with a possible bonus of 5% points in regions covered by Article 107(3)(c) TFEU and a bonus of 15% points in regions covered by Article 107(3)(a) TFEU. If the aid is allocated through a competitive bidding process, the aid intensity allowed is 100%.

be requested for district heating/cooling networks, when project costs exceed EUR 5 million (see §20(5) KWKG).

(112) In addition, when the project owner of a district heating/cooling network project is allocated more than EUR 15 million, Germany committed that the authorisation is issued only after Commission approval of the project (individual notification).

(113) The aid is granted according to the aid intensities described in Table 14 below.

Table 14 - Aid intensities for district heating/cooling networks

	Before the reform	**After the reform**
Small networks (diameter < 100 mm)	100 €/m pipe with a max. of 40% of costs	40% of costs
	Max. EUR 20 million per project	Max. EUR 20 million per project
Larger networks (diameter > 100 mm)	30% of costs	40% of costs
	Max. EUR 20 million per project	Max. EUR 20 million per project

(114) Germany explains that the costs of installing distribution lines have increased in recent years due, *inter alia*, to high demand and increased costs in the civil engineering sector. This concerns, in particular, the construction site costs for the installation of the domestic connections to the distribution network, which are usually over 100 millimetres wide. On average, the increased supply of RES heat will also require higher pipe diameters. Combined with the higher installation costs, this leads to an overall increase in investment costs in the piping systems of more than 100 millimetres diameter. This explains the increase in the percentage of costs covered by the support for larger networks, as presented in Table 14.

(115) Furthermore, as a transitory measure until 31 December 2022, heating/cooling networks respecting the previous rules mentioned in recital (108)(i.e. which either contain at least a 75% share of CHP or at least a 50% share of CHP heat, RES heat and waste heat combined) will only be able to receive support up to 30% of the eligible costs.

(116) Eligible costs are all costs related to the construction or expansion of the network and resulting from services and goods delivered by third parties. Not eligible are: administrative fees, internal costs for the construction and planning, imputed costs ("*kalkulatorische Kosten*"), costs related to insurances, financing and land acquisition.

(117) Germany has explained that for district heating/cooling networks the funding gap corresponds to around 40% of the investment costs. It has submitted a detailed funding gap calculation for an average district heating system (town of 150 000

inhabitants, diameter >100 mm and aid amount of 40% of investment costs, all values discounted with rate of 8%). Table 15 below summarises the results of the funding gap calculation.

Table 15 - Summary of funding gap calculation for average district heating system-source: notification file

(Net) Investments district heating network 1 after deduction of the costs that have to be borne by customers	20.397.584
Revenues and deduction of operating expenses (Operating Profit)	10.335.496
Ratio operating profit / net investment costs 1	51%
Remaining Funding gap	49%
Difference between net investment costs 1 and operating profit	-10.062.088
Amount of support	8.159.034
Difference between net investment costs 1, operating profit and support	-1.903.054
	The value is negative

(118) In case of additional aid at local, regional or federal level, Germany has committed to verifying that the cumulated aid would not exceed the funding gap authorised under the EEAG, i.e. the difference between the positive and the negative cash flows over the lifetime of the investment, discounted to their current value (typically using the cost of capital) (see point 19(32) of the EEAG).

2.6. Production costs of CHP installations

(119) Germany has submitted LOCE calculations for the production of cogenerated electricity in a series of representative installations for the district heating sector outside the tendering segment (one 100 MW, one 200 MW and one 450 MW installation) and 13 representative CHP installations used by households (single family houses or multiple family houses), service providers (retail, schools, hospitals, hotels) and the industry (manufacture of machinery and equipment, manufacture of automotive components). Other sectors of the industry presented in table 12 and 13 of the 2016 decision are not included here, because they typically use CHP installations falling within the tendering segment (500 kW – 50 MW). Germany has also provided LCOE calculations for CHP installations used by so-called contractors who operate a CHP installation to provide heat and power to a limited number of consumers (industry parks, for instance). Finally, they have also provided LCOE calculations for installations benefitting from the innovative RES heat bonus and the coal-switch bonus. All calculations concern gas-fired CHP installations.

(120) Germany has calculated the LCOE based on the following formula:

$$LCOE = \frac{I_0 + \sum_{t=1}^{n} \frac{A_t}{(1+i)^t}}{\sum_{t=1}^{n} \frac{M_{t,therm}}{(1+i)^t}}$$

Where:

LCOE	Levelised cost of electricity
I_0	Investment in Euro
A_t	Annual total costs in Euro in the year t

$M_{t,therm}$	Volume of electricity produced in the concerned year in kWh
i	Discount factor in %
n	Economic lifetime of the installation in years
t	Year considered during the economic lifetime

(121) For each calculation, Germany has also provided: the type of CHP installation used, the number of full load hours, the rate at which the installation is used for self-consumption,[31] the sector concerned, the typical investment costs, the energy conversion efficiency rate, the heat and electricity outputs, and the fixed and variable operating costs. For the variable operating costs, Germany has further submitted the projected gas prices, electricity prices (both electricity price obtained when the electricity is injected into the grid and electricity price that is saved when the electricity generated is self-consumed), and the compensation for avoided network charges.[32] The LCOE calculations also take into account reduced energy taxes and costs of CO_2 emission allowances, where the installation is under the obligation to buy CO_2 emission allowances under the EU-ETS or under the national carbon pricing scheme ("Brennstoffemissionshandelsgesetz"-BEHG[33]), and heat revenues. As far as heat revenues are concerned, Germany has taken the heat price into account for the district heating sector and the avoided heating costs for the other operators, since they would have had to buy or produce the heat in a boiler, had they not cogenerated it. The heat price obtained in the district heating sector has been computed based on the observation that the district heating sector needs to provide heat at the least cost possible as it has to compete with decentralized heat production. A CHP installation feeding heat into the grid is in competition essentially with gas boilers, other CHP installations and sometimes also incineration facilities or industrial heat. The heat price then corresponds to the marginal costs of the cheapest plant that is able to produce the demanded heat. For the purpose of determining the heat price taken into account for the LCOE calculations, Germany assumed that the heat demand would be covered 50% by gas boilers and 50% by CHP installations.

(122) Given that at the moment guarantees of origin do not bear any revenues, the submitted LCOE calculations do not take them into account. Nevertheless, Germany committed to monitor them pursuant to article 14 (10) of the Energy Efficiency Directive together with other productions costs (see recital (142)) and reflect them accordingly in LCOE calculations in case of change.

(123) The tables below represent the assumptions used in terms of consumption, gas and electricity prices.

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31 Electricity produced from CHP installations used in the district heating sector is generally entirely injected into the public grid but electricity produced in CHP installations run by households, service providers and the industry is generally partially used for auto-consumption and partially injected into the grid.

32 See footnote 16.

33 https://www.gesetze-im-internet.de/behg/BJNR272800019.html

Table 16 - Typical consumption in the sectors examined by Germany – source: Prognos 2019 and notification file

Sector	Activity	Electricity	Heating	Electricity	Gas
		MWh/a	MWh/a	Category	Category
Households	Single-family house	4	20	Households	Households
Households	Two-family house,	8	37	Households	Households
Housing	12-family apartment block	42	120	Households	GHD1
Housing	60-family apartment block	150	450	GHD1	GHD2
Trade and services	Services	50	125	GHD1	GHD1
Trade and services	School	80	700	GHD2a	GHD3
Trade and services	Retail	200	500	GHD2	GHD3
Trade and services	Hospital care	1 000	3 500	GHD3a	GHD4
Trade and services	Hotel	1 000	1 400	GHD3	GHD3
Trade and service	Services (big)	10 000	25 000	GHD3	GHD4
Industry	E.g., manufacture of machinery and equipment	5 000	12 500	Industry 3	Industry 3
Industry	E.g., manufacture of automotive components	10 000	25 000	Industry 4	Industry 4
Industry	E.g. car plant	100 000	200 000	Industry 5	Industry 5
Industry	E.g Paper (Besar)	100 000	200 000	Industry 6	Industry 5
Industry	E.g. Chemistry (Besar)	1 000 000	2 000 000	Industry 7	Industry 6

Table 17 - Retail prices of gas to customers per category of consumer and consumption levels by 2040, real, gross calorific value, with or without VAT, with CO2 price as of 2020, in € cents 2017/kWh – source: Prognos 2019 and notification file

Consumer category	2019	2020	2030	2040
Households; < 55 500 kWh/year (with VAT)	6,1	6,8	7,8	9,2
GHD1 ; < 55 500 kWh/year	5,1	5,7	6,6	7,8
GHD 2; > 55 555 kWh/year	4,6	5,2	6,0	7,1
GHD 3; < 2,7 MWh/year	3,8	4,4	5,1	6,0
GHD 4; < 27,7 GWh/year	3,4	4,0	4,7	5,5
Industry 1; < 277 MWh/year	4,2	4,8	5,6	6,6
Industry 2; < 2.7 GWh/year	3,6	4,2	4,9	5,8
Industry 3; < 27.7 GWh/year	3,3	3,8	4,5	5,3
Industry 4; < 278 GWh/year	2,6	3,1	3,7	4,4
Industry 5; < 1 111 GWh/year	2,3	2,8	3,4	4,0
Industry 6; > 1 111 GWh/year	2,2	2,7	3,3	3,8

Table 18 - Electricity prices for households, commercial customers and industrial customers in € cents 2017/kWh – source: Prognos 2019 and notification file

Short name	Consumer category [network level]	2019	2020	2030	2040
Household	Households, 3.500 kWh per year, [low voltage] (incl. VAT)	29,9	30,9	28,7	28,3
GHD1	Trade and services, 50 MWh per year, [low voltage]	23,2	23,7	21,6	21,0
GHD2	Trade and services, 200 MWh per year, [low voltage]	21,3	21,9	19,8	19,1
GHD2a	School, 200 MWh per year, [low voltage]	25,4	26,0	23,5	22,7
GHD3	Services (big), 1.000 MWh per year, [medium voltage], with VAT	17,3	17,8	15,3	14,2
GHD3a	Hospital care, [medium voltage], with VAT	20,5	23,1	21,1	20,5
IND1	Small industry, 50 MWh per year, [low voltage]	22,5	23,1	21,1	20.5
IND2	SMEs, 200 MWh per year, [low voltage]	20,8	21,4	19,4	18,8
IND3	SMEs, 1 000 MWh per year, [medium voltage]	16,8	17,3	15,0	13,9
IND4	industry, 10 000 MWh per year, [medium voltage],	15,1	15,6	13,2	12,1
IND5	industry, 100 000 MWh per year, [high voltage]	13,8	14,3	12,0	10,8
IND6	Energy intensive industry, 100 000 MWh per year, [high voltage], , with EEG-surcharge reduction (Besar, see §64 (2) '. b) of EEG 2017)	4,4	4,7	6,9	7,3
IND7	Energy intensive industry, 1 000 000 MWh per year, [high voltage], with EEG-surcharge reduction (Besar, see §64 (2) '. b) of EEG 2017)	4,0	4,3	6,5	6,9

Table 19 – Assumptions on the prices of several commodities – source: Prognos 2019 and notification file

	Wholesale market electricity price (Baseload)	Wholesale market gas price (Ho)	EU-ETS allowances price[34]	National CO2-Price (BEHG)[35]
	EUR2019/MWh	Cent2019/kWh	EUR2019/t	EUR2019/t
2020	35	1,1	25	
2021	45	1,3	26	24
2022	48	1,5	27	28
2023	50	1,7	27	32
2024	53	2,0	27	40
2025	53	2,1	27	48
2026	56	2,2	28	55
2027	57	2,2	29	75
2028	58	2,2	31	94
2029	61	2,2	33	114
2030	63	2,2	36	145
2031	63	2,2	38	152
2032	63	2,3	39	159
2033	63	2,3	41	166
2034	65	2,3	43	173
2035	67	2,3	45	180
2036	67	2,4	47	184
2037	67	2,4	48	188
2038	66	2,4	50	192
2039	65	2,5	52	196
2040	68	2,5	53	200

2.6.1. LCOE for general CHP support outside tenders

(124) The following tables recap the resulting LCOE calculations. They include the rate of return of the investment taking into account the general CHP support under the KWKG when the installation is eligible for such support. They also contain a comparison with the average market price (average obtained from the market price of the energy injected into the grid and the market price of the electricity that would have had to be paid if the autoconsumed electricity had been purchased from a supplier) and with the support level. As regards the rate of return, the word "negative" refers to a situation where the rate of return is significantly below 0 and no result could be mathematically shown. Table 24 to

[34] The CO2 prices for the EU ETS were aligned with the National Energy and Climate Plan (NECP) framework document (see Prognos 2020) and adapted to the actual trend observed. Other minor differences arise from different base years (NECP: 2016 and KWKG: 2019) for real value calculations. See Prognos 2020: „Energiewirtschaftliche Projektionen und Folgeabschätzungen 2030/2050" - Dokumentation von Referenzszenario und Szenario mit Klimaschutzprogramm 2030. Im Auftrag des BMWi. 10. März 2020 : https://www.bmwi.de/Redaktion/DE/Publikationen/Wirtschaft/klimagutachten.html

[35] The CO2 prices for the BEHG are based on Prognos 2020 (see footnote 34). Slight variations are due to different base years of real value calculation (NECP: 2016, KWKG: 2019).

Table 26 present the LCOE calculations for CHP installations receiving the support described in recital (62) above (support to "Contractors").

Table 20 - Housing, up to 100 kWel, calculation over 10-year period (2020-2029) with a discount rate of 10% per year – in € 2019 cents/kWh - source: notification file

type of housing	1-family house	2-family house	2-family house	12-appartment block
Type of CHP installation	BHKW 1	BHKW 1	BHKW 2	BHKW 2
el. capacity	1 kW	1 kW	5 kW	5 kW
Full-load hours	5 000 h/y	6 000 h/y	3 000 h/y	6 000 h/y
Self-consumption rate	50%	70%	40%	10%
EEG surcharge	40%	40%	40%	40%
Rate of return with CHP-support	negative	negative	-26%	negative
LCOE	94,17	81,70	63,78	37,91
Average market price	19,42	24,44	16,91	9,38
Difference between LCOE and market price	74,75	57,26	46,87	28,53
CHP-support	7,82	5,95	11,41	6,77
CHP support equal or smaller than the difference between LCOE and market price	yes	yes	yes	yes

Table 21 - Trade and services, outside the BesAR[36], up to 100 kWel, 10-year period (2020 to 2029) with a discount rate of 20% per year – in € 2019 cents/kWh - source: notification file

Designation	MFH 60	Services	School	Retail	Hospital	Hotel	Local utility
plant type	BHKW 2	BHKW 2	BHKW 3	BHKW 3	BHKW 3	BHKW 3	BHKW 3a
el. power	5 kW	5 kW	50 kW	50 kW	50 kW	50 kW	100 kW
Full load hours	7 500 h/y	6 000 h/y	4 500 h/y	4 500 h/y	6 000 h/y	6 000 h/y	5 000 h/y
self-consumption rate	40%	80%	30%	50%	90%	90%	90%
EEG-surcharge	40%	40%	40%	40%	40%	40%	40%
Rate of return (with CHP-support)	negative	-14 %	-29 %	7 %	13 %	13 %	6 %
LCOE	35,23	41,70	26,40	26,40	21,95	21,95	20,79
Average market price	13,17	19,12	10,39	12,80	14,40	14,40	14,40

[36] Electro-intensive undertakings within the meaning of the "Besondere Ausgleichregelung" under the EEG (BesAR).

Difference between LCOE and market price	22,05	22,58	16,01	13,59	7,55	7,55	6,39
CHP-support	7,41	6,37	10,54	9,34	5,84	5,84	2.82
CHP support equal or smaller than the difference between LCOE and market price	yes	yes	yes	yes	yes	yes	yes

Table 22 - Non electro-intensive industry (not eligible under BesAR), more than 100 kWel but outside the tendering segment, 15 year period (2020-2034); 30% per year discount rate – in €2019 cents/kWh - source: notification file

Sector	Manufacture of machinery and equipment	Manufacture of automotive components
Installation type	BHKW 4	BHKW 4
El. capacity	500 kW	500 kW
Full-load hours	5 000 h/y	5 000 h/y
Self-consumption rate	80%	90%
EEG-surcharge	40%	40%
Rate of return (including CHP-support)	18 %	14 %
LCOE	16,65	16,10
Average market price	13,09	12,23
Difference between LCOE and market price	3,56	3,87
CHP-support per electricity unit produced	0.92	0,46
CHP support equal or smaller than the difference between LCOE and market price	yes	yes

Table 23 - Electro-intensive industry (eligible under BesAR, receiving the support presented in Table 4 above), outside the tendering segment, 10 year period (2020-2029); 30% per year discount rate – in €2019 cents/kWh - source: notification file

Sector	Paper	Paper	Paper
Installation type	BHKW 3	BHKW 3a	BHKW 4
El. capacity	50 kW	100 kW	500 kW
Full-load hours	5 000 h/y	5 000 h/y	5 000 h/y

Self-consumption rate	90%	90%	80%
EEG-surcharge	BesAR	BesAR	BesAR
Rate of return (including CHP-support)	-8 %	-[37]	-7%
LCOE	23,06	21,78	15,56
Average market price	5,35	5,35	5,45
Difference between LCOE and market price	17,71	16,42	10,11
CHP-support per electricity unit produced	5,28	3,99	2,99
CHP support equal or smaller than the difference between LCOE and market price	yes	yes	yes

Table 24 – Contractor, Housing, up to 100 kWel, calculation over 10-year period (2020-2029) with a discount rate of 10% per year – in € 2019 cents/kWh - source: notification file

Type of housing	2-family house	2-family house	2-family house	12-appartment block
Type of CHP installation	BHKW 2	BHKW 1	BHKW 2	BHKW 2
el. capacity	5 kW	1 kW	5 kW	5 kW
Full-load hours	3 000 h/y	6 000 h/y	3 000 h/y	6 000 h/y
Self-consumption rate	40%	70%	40%	10%
EEG surcharge	100%	100%	100%	100%
Rate of return with CHP-support	negative	negative	-32%	negative
LCOE	94,17	81,70	63,78	37,91
Average market price	16,71	20,64	14,74	8,84
Difference between LCOE and market price	77,47	61,05	49,04	29,07
CHP-support	7,82	5,95	11,41	8,69
CHP support equal or smaller than the difference between LCOE and market price	yes	yes	yes	yes

[37] Negative/cannot be calculated.

Table 25 – Contractor, Trade and services, outside the BesAR, up to 100 kWel, 10-year period (2020 to 2029) with a discount rate of 20% per year – in € 2019 cents/kWh - source: notification file

Designation plant type el. power Full load hours self-consumption rate EEG-surcharge	MFH 60 BHKW 2 5 kW 7 500 h/y 40% 100%	Services BHKW 2 5 kW 6 000 h/y 80% 100%	School BHKW 3 50 kW 4 500 h/y 30% 100%	Retail BHKW 3 50 kW 4 500 h/y 50% 100%	Hospital BHKW 3 50 kW 6 000 h/y 90% 100%	Hotel BHKW 3 50 kW 6 000 h/y 90% 100%	Local utility BHKW 3a 100 kW 5 000 h/y 90% 100%
Rate of return (with CHP-support)	negative	negative	-23%	-37%	-25%	-25%	-35%
LCOE	35,23	41,70	26,40	26,40	21,95	21,95	20,79
Average market price	11,17	15,57	9,38	11,13	11,27	11,27	11,27
Difference between LCOE and market price	24,06	26,13	17,01	15,27	10,68	10,68	9,52
CHP-support	7,41	6,37	10,54	9,34	5,84	5,84	2,82
CHP support equal or smaller than the difference between LCOE and market price	yes	yes	yes	yes	yes	yes	yes

Table 26 – Contractor, non electro-intensive industry (not eligible under BesAR), more than 100 kWel but outside the tendering segment, 15 year period (2020-2034); 30% per year discount rate – in €2019 cents/kWh - source: notification file

Sector	Manufacture of machinery and equipment	Manufacture of automotive components
Installation type	BHKW 4	BHKW 4
El. capacity	500 kW	500 kW
Full-load hours	5 000 h/y	5 000 h/y
Self-consumption rate	80%	90%
EEG-surcharge	100%	100%
Rate of return (including CHP-support)	13%	8%
LCOE	16,65	16,10
Average market price	10,28	9,07

Difference between LCOE and market price	6,37	7,04
CHP-support per electricity unit produced	2,41	2,13
CHP support equal or smaller than the difference between LCOE and market price	yes	yes

Table 27 - LCOE district heating – new installations (outside the tendering segment) 20 year period (2020-2029) 8% discount rate – in €2018/MWh - source: notification file

Installation type	GuD2	GuD 3	GuD 4
El. capacity	100 MW	200 MW	450 MW
Rate of return (including CHP-support)	4,8%	6,8%	7,3%
LCOE	101	87	80
Average market price	55	55	55
Difference between LCOE and market price	46	32	25
CHP-support per electricity unit produced	25	24	22
CHP support equal or smaller than the difference between LCOE and market price	yes	yes	yes

Table 28 - LCOE district heating, new installations – source: notification file

[…]: Business secrets: the data refers to individual projects and would therefore allow disclosure of confidential business data.

Parameters	Year	2020	2021	2022	2025	2030	2035	2040
Full-load-hours	h/a	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Electricity production	MWh	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Heat production	MWh	[…]	[…]	[…]	[…]	[…]	[…]	[…]
	EUR2019/MWh	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Gas price free plant	Hu							
Heat price	EUR2019/MWh	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Costs of CO2	EUR2019/t	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Costs - Total	**EUR2019**	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**
Investment	EUR2019	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Fuel	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
CO2 certificates	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Variable operating costs	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Fixed operating costs	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Ramp up costs (fuel and wear and tear)	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
			[…]	[…]	[…]	[…]	[…]	[…]
Revenues outside electricity production	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Heat revenues	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Compensation for avoided network fees*	EUR2019							
Remaining costs	**EUR2019**	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**	**[…]**
LCOE								
Electricity production - discounted			[…]	[…]	[…]	[…]	[…]	[…]
Remaining costs - discounted		[…]	[…]	[…]	[…]	[…]	[…]	[…]
LCOE without CHP-support	EUR2019/MWh	[60-90]						
Market price and CHP-support								
Average market price (base)	EUR2019/MWh	[…]	[…]	[…]	[…]	[…]	[…]	[…]
CHP-support	EUR2019/MWh	[…]	[…]	[…]	[…]	[…]	[…]	[…]

Revenues from average market price base	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Revenues from CHP-support	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Revenues from average market price (base) - discounted	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Revenues from CHP-support - discounted	EUR2019		[…]	[…]	[…]	[…]	[…]	[…]
Levelised market price	EUR2019/MWh	55						
Levelised CHP-support	EUR2019/MWh	22						

(125) Germany submitted to the Commission an example of the LCOE calculation for three installations (GuD2/100MW, GuD3/200MW, GuD4/450MW) that it will conduct if it decides to implement the increase in the general CHP support described in recital (65). Germany committed to implement the increase only if it demonstrates to the Commission by 30 June 2022 using the same LCOE methodology that it will not result in an overcompensation. If any of the elements of the methodology would diverge, Germany will re-notify the measure for the Commission's approval.

2.6.2. LCOE for existing CHP installations in 2018 and 2019

(126) Germany has submitted LCOE calculations for existing CHP installations for the years 2018 and 2019, which are determined in exactly the same way as the calculations of the 2016 decision. All calculations concern gas-fired CHP installations. As several categories have been created through the amendment with varying premia, Germany has provided these calculations based on representative examples of installation types. The installation types selected for existing (depreciated) CHP installations are based on the installation types used for new installations in the 2016 decision, augmented by two addition installation types covering the maximum size of the 2-50 MW and 201-300 MW categories. As the calculations show decreasing LCOE with increasing size, Germany particularly provided estimates for the largest possible installation size per category, showing that even in this case overcompensation would not occur.

Table 29 - LCOE district heating — existing installation

[…]: Business secrets: the data refers to individual projects and would allow disclosure of confidential business data.

Power Plant			**BHKW 6**			**GuD 1**	
Year			**2018**	**2019**		**2018**	**2019**
Parameters							
Power	MW	[…]			[…]		
Full-load hours	h		[…]	[…]		[…]	[…]
Electricity generation	MWh		[…]	[…]		[…]	[…]
Heat production	MWh		[…]	[…]		[…]	[…]
Prices							
Natural gas prices at power station (Hu)	€ 2016/ MWh		[…]	[…]		[…]	[…]
Heat price	€ 2016/ MWh		[…]	[…]		[…]	[…]
price of CO2-allowances	€ 2016/ t		[…]	[…]		[…]	[…]
Costs (total)			**[…]**	**[…]**		**[…]**	**[…]**
Investment	€ 2016		/	/		/	/
Fuel	€ 2016		[…]	[…]		[…]	[…]
CO2 allowances *	€ 2016		[…]	[…]		[…]	[…]
Variable operating costs	€ 2016		[…]	[…]		[…]	[…]
Fixed operating costs	€ 2016		[…]	[…]		[…]	[…]
Ramp up costs	€ 2016		[…]	[…]		[…]	[…]
** including free CO2 allowances due to CHP heat generation*							
Revenues outside electricity generation			**[…]**	**[…]**		**[…]**	**[…]**
Revenue for heat generation	€ 2016		[…]	[…]		[…]	[…]
Compensation avoided network fees	€ 2016		[…]	[…]		[…]	[…]
Remaining costs	**€ 2016**		**[…]**	**[…]**		**[…]**	**[…]**
Calculation of LCOE							
Discounted electricity production	MWh		[…]	[…]		[…]	[…]
Residual costs - discounted	€ 2016		[…]	[…]		[…]	[…]
LCOE without CHP-support	€2016/MWh	52,3			65,6		

Calculation of market price and CHP-support							
Average market price (base)	€2016/MWh		[…]	[…]		[…]	[…]
CHP-support	€2016/MWh		[…]	[…]		[…]	[…]
Proceeds from average market price (base)	€ 2016		[…]	[…]		[…]	[…]
Proceeds from CHP-support	€ 2016		[…]	[…]		[…]	[…]
Proceeds from average market price (base), discounted	€ 2016		[…]	[…]		[…]	[…]
Proceeds from CHP-support, discounted	€ 2016		[…]	[…]		[…]	[…]
Levelised market price	€2016/MWh	36,3			35,9		
Levelised proceeds from CHP-support	€2016/MWh	14,4			14,5		

Power Plant		GuD 2a			GuD 2		
Year			**2018**	**2019**		**2018**	**2019**
Parameters							
Power	MW	[…]			[…]		
Full-load hours	h		[…]	[…]		[…]	[…]
Electricity generation	MWh		[…]	[…]		[…]	[…]
Heat production	MWh		[…]	[…]		[…]	[…]
Prices							
Natural gas prices at power station (Hu)	€ 2016/ MWh		[…]	[…]		[…]	[…]
Heat price	€ 2016/ MWh		[…]	[…]		[…]	[…]
price of CO2-allowances	€ 2016/ t		[…]	[…]		[…]	[…]
Costs (total)			**[…]**	**[…]**		**[…]**	**[…]**
Investment	€ 2016						
Fuel	€ 2016		[…]	[…]		[…]	[…]
CO2 allowances *	€ 2016		[…]	[…]		[…]	[…]
Variable operating costs	€ 2016		[…]	[…]		[…]	[…]
Fixed operating costs	€ 2016		[…]	[…]		[…]	[…]
Ramp up costs	€ 2016		[…]	[…]		[…]	[…]
** including free CO2 allowances due to CHP heat generation*							
			[…]	**[…]**		**[…]**	**[…]**

Revenues outside electricity generation							
Revenue for heat generation	€ 2016		[…]	[…]		[…]	[…]
Compensation avoided network fees	€ 2016		[…]	[…]		[…]	[…]
Remaining costs	**€ 2016**		**[…]**	**[…]**		**[…]**	**[…]**
Calculation of LCOE							
Discounted electricity production	MWh		[…]	[…]		[…]	[…]
Residual costs - discounted	€ 2016		[…]	[…]		[…]	[…]
LCOE without CHP-support	€2016/MWh	52,6			49,7		
Calculation of market price and CHP-support							
Average market price (base)	€2016/MWh		[…]	[…]		[…]	[…]
CHP-support	€2016/MWh		[…]	[…]		[…]	[…]
Proceeds from average market price (base)	€ 2016		[…]	[…]		[…]	[…]
Proceeds from CHP-support	€ 2016		[…]	[…]		[…]	[…]
Proceeds from average market price (base), discounted	€ 2016		[…]	[…]		[…]	[…]
Proceeds from CHP-support, discounted	€ 2016		[…]	[…]		[…]	[…]
Levelised market price	€2016/MWh	36,1			36,0		
Levelised proceeds from CHP-support	€2016/MWh	14,5			13,5		

Power Plant		**GuD 3**			**GuD 3a**			**GuD 4**		
Year			**2018**	**2019**		**2018**	**2019**		**2018**	**2019**
Parameters										
Power	MW	[…]			[…]			[…]		
Full-load hours	h		[…]	[…]		[…]	[…]		[…]	[…]
Electricity generation	MWh		[…]	[…]		[…]	[…]		[…]	[…]
Heat production	MWh		[…]	[…]		[…]	[…]		[…]	[…]
Prices										
Natural gas prices at power station (Hu)	€ 2016/ MWh		[…]	[…]		[…]	[…]		[…]	[…]
Heat price	€ 2016/ MWh		[…]	[…]		[…]	[…]		[…]	[…]

price of CO2-allowances	€ 2016/ t		[…]	[…]		[…]	[…]		[…]	[…]
Costs (total)			**[…]**	**[…]**		**[…]**	**[…]**		**[…]**	**[…]**
Investment	€ 2016									
Fuel	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
CO2 allowances *	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Variable operating costs	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Fixed operating costs	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Ramp up costs	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
** including free CO2 allowances due to CHP heat generation*										
Revenues outside electricity generation			**[…]**	**[…]**		**[…]**	**[…]**		**[…]**	**[…]**
Revenue for heat generation	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Compensation avoided network fees	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Remaining costs	**€ 2016**		**[…]**	**[…]**		**[…]**	**[…]**		**[…]**	**[…]**
Calculation of LCOE										
Discounted electricity production	MWh		[…]	[…]		[…]	[…]		[…]	[…]
Residual costs - discounted	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
LCOE without CHP-support	€2016/MWh	47,1			46,4			43,8		
Calculation of market price and CHP-support										
Average market price (base)	€2016/MWh		[…]	[…]		[…]	[…]		[…]	[…]
CHP-support	€2016/MWh		[…]	[…]		[…]	[…]		[…]	[…]
Proceeds from average market price (base)	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Proceeds from CHP-support	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Proceeds from average market price (base), discounted	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Proceeds from CHP-support, discounted	€ 2016		[…]	[…]		[…]	[…]		[…]	[…]
Levelised market price	€2016/MWh	36,3			36,5			36,5		
Levelised proceeds from CHP-support	€2016/MWh	9,6			8,7			6,7		

2.6.3. LCOE for the innovative RES-heat bonus

(127) As regards the innovative RES heat bonus described in section 2.2.2.2, Germany provided additional cost calculations. Table 30 and Table 31 present the additional assumptions used. Table 32 and Table 33 recap the resulting LCOE calculations. They include the rate of return of the investment taking into account the general CHP support under the KWKG as well as the innovative RES heat bonus. They also contain a comparison with the average market price (average obtained from the market price of the energy injected into the grid) and with the support level. As regards the segment of CHP installations below 100 MW, Germany indicates that BHKWs are currently the standard CHP technology in new construction. In most cases, CHP modules with an output of 10 MW each are combined (X x 10MW). Therefore, Germany has used "BHKW6" with 10 MWel as the basis for the calculations. Cases with 50 and 80 MW are shown in the Table 30 below, i.e. plants with 5 or 8 modules of 10 MW. Due to the modular design, there are hardly any economies of scale (two motors cost almost twice as much as one). In practice, smaller savings in larger systems are offset by additional costs for emission control (noise and air pollutants) and the more complex infrastructure (gas and electricity connections, in some cases power plant buildings). In the 10 to 100 MW range, motor power plants therefore have roughly the same investment costs, regardless of their output, and the operating parameters are also the same. All cases correspond to the district heating sector[38].

Table 30 – Additional assumptions on CHP installations – source: notification file

Type of CHP installation		**GuD2**	**GuD3**	**GuD4**	**BHKW6**	**BHKW6**
Capacity	MWel	100	200	450	50	80
El. efficiency factor		45%	50%	55%	46%	46%
Th. efficiency factor		43%	38%	33%	42%	42%
Investment costs including planning costs	EUR2019/kWel	1 250	1 150	1 050	900	900
Fixed operating costs	EUR2019/kWel/y	17	17	17	9	9
Variable operating costs	EUR2019/MWh el	2	2	2	10	10
Full load hours	h/y	3500	3500	3500	3500	3500

[38] According to Germany, the possible renewable energy technologies (solar thermal, heat pumps, geothermal energy) are in principle suitable for producing district heating with a maximum temperature of approximately 100 °C. The production of process heat (with usually significantly higher temperatures) for industrial application is not possible with these technologies or only partially at significantly higher costs (e.g. lower efficiency in heat pumps). Germany does not expect that the innovative RES bonus will be combined with industrial CHP plants.

Table 31 – Examples of RES-heat technologies used in the LCOE calculations – source: notification file

Example – solar thermal (evacuated tube collectors)		
Production per m2	MWh/m2/y	0,5
Investment	EUR2019/m2	360
Fixed operating costs (Pacht)	EUR2019/m2/y	0,2
Variable operating costs	EUR2019/MWhth	2,5
Example - big heat pump		
Investment	EUR2019/kW th	1037
Fixed operating costs	EUR2019/ kW	12
Variable operating costs	EUR2019/ MWh th	3,5
JAZ		3,5
Full load hours	h	4000
Example - geothermal		
Investment	EUR2019/kW th	2914
Fixed operating costs	EUR2019/ kW	30
Variable operating costs	EUR2019/ MWh th	7
Self-consumption (pump) – relative to the thermal output		11%
Full load hours	h	5000

Table 32 – LCOE - CHP installations above 100 MW, 20 year period (2020-2029) 8% discount rate, in € 2019 /MWh – source: notification file

Case nbr	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
CHP type	GuD 2	GuD 2	GuD 2	GuD 2	GuD 2	GuD 2	GuD 4	GuD 4	GuD 4	GuD 4	GuD 4	GuD 4
Capacity, el.	100 MW	100 MW	100 MW	100 MW	100 MW	100 MW	400 MW	400 MW	400 MW	400 MW	400 MW	400 MW
Type of RES heat production	Solar thermal	Heat pump	Geothermal	Solar thermal	Heat pump	Geothermal	Solar thermal	Heat pump	Geothermal	Solar thermal	Heat pump	Geothermal
Share of RES heat	5%	5%	5%	50%	50%	50%	5%	5%	5%	50%	50%	50%
Rate of return of the project (including support)	2,7%	2,1%	2,1%	5,1%	1,6%	0,8%	6,0%	5,8%	5,7%	7,8%	6,2%	5,1%
LCOE	98	98	99	143	144	158	90	90	91	124	127	133
Average market price	57	57	57	57	57	57	57	57	57	57	57	57
LCOE - market price	41	41	42	86	87	100	33	33	34	67	70	76
General CHP support + innovative RES heat bonus	23	23	23	63	63	63	23	23	23	63	63	63

Support equal or smaller than the difference between LCOE and market price	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Table 33 – LCOE - CHP installations below 100 MW, 20 year period (2020-2029) 8% discount rate, in € 2019 /MWh – source: notification file

Case nbr	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*
CHP type	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6	BHKW 6
Capacity, el	50 MW	50 MW	50 MW	50 MW	50 MW	50 MW	80 MW	80 MW	80 MW	80 MW	80 MW	80 MW
Type of RES heat production	Solar thermal	Heat pump	Geothermal	Solar thermal	Heat pump	Geothermal	Solar thermal	Heat pump	Geothermal	Solar thermal	Heat pump	Geothermal
Share of RES heat	5%	5%	5%	50%	50%	50%	5%	5%	5%	50%	50%	50%
Rate of return of the project (including support)	4,9%	4,3%	3,8%	6,4%	3,9%	2,0%	4,9%	4,3%	3,8%	6,4%	3,9%	2,0%
LCOE	91	91	92	134	135	148	91	91	92	134	135	148
Average market price	57	57	57	57	57	57	57	57	57	57	57	57

LCOE - market price	34	34	35	77	78	91	34	34	35	77	78	91
General CHP support + innovative RES heat bonus	23	23	23	63	63	63	23	23	23	63	63	63
Support equal or smaller than the difference between LCOE and market price	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

2.6.4. LCOE for combination of bonuses

(128) As regards the combination of general CHP support and the innovative RES heat bonus with the coal-switch bonus, Germany indicates that the project return for cases with a coal switch bonus cannot be higher than without, because the foregone profits from the early closure of coal-fired CHP are taken into account.

(129) In the below Table 34, Germany has provided LCOE calculations for one example, combining the general CHP support, the innovative RES heat bonus and the coal switch bonus. As regards the coal-switch bonus, Germany used the following assumptions: commissioning of the new CHP plant in 2022, replacement of a coal-fired CHP plant (commissioned after 1994), coal switch bonus of EUR 390/kW.

Table 34 – LCOE calculations for examples of combination of the general CHP support, the innovative RES heat bonus and the coal-switch bonus - 20-year period (2020-2029) 8% discount rate, in € 2019 /MWh – source: notification file

Type of technology for the RES heat	Solar	Heat pump	Geothermal
CHP type	GuD 3	GuD 3	GuD 3
Rate of return of the project (including support)	2,4%	3,7%	3,6%
LCOE	104	139	147
Average market price	57	57	57
LCOE - market price	47	82	90
Total CHP support	31	70	70
CHP support equal or smaller than the difference between LCOE and market price	yes	yes	yes

2.6.5. Rates of return

(130) The calculations presented in the present section use the following discount rates: 8% for the district heating sector, 10% for households, 20% for the service sector and 30% for the industry. Germany considers that the justification for using them, as presented in recitals (54) to (63) of the 2016 decision, remain valid. The following recitals present them.

(131) For the district heating sector, Germany indicated that 8% corresponds to the average rate of return observed in the sector. It submitted a survey based on actual projects and conducted by the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM) showing that the average rate of return for the surveyed projects was 8.1%.

(132) For households, the service sector and the industry, Germany has explained that the rates of return needed to trigger investments in those segments can vary

greatly from one investor to another. For instance, while in the industry some project owners will engage into the project if it has a payback period of 5 years, others will require a payback period of 2 years. A 5-year payback period roughly equates to an annual project return of 20%,[39] a period of two years equates to an annual project return of 50% and a payback period of three years equates to a project return of 33%.

(133) Based on this observation, when it designed the level of support Germany had to conciliate two objectives: on the one hand ensure that enough CHP projects outside the district heating sector would be incentivised so as to meet its target and at the same time maintain the budget of the scheme within a certain limit. The discount rates in the service sector and in the industry (respectively 20% and 30%) used by Germany correspond roughly to what a significant portion of project owners would require as project return to implement the CHP project in Germany.

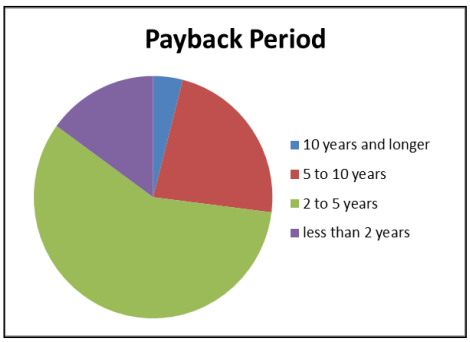
(134) Germany has submitted that the higher rates of return required by market participants in sectors other than district heating can be explained by the fact that district heating companies are energy utilities and energy production belongs to their core business. The other sectors, however, are not specialised in energy production. While a more energy-efficient production could result in cost savings for them, it might also increase the complexity of operations. For those companies, the investment into the CHP installation does not constitute an investment into a side activity with its own costs and revenues, but an investment having an impact on the production costs of the main activity of the company. Since operating a cogeneration installation is technically more complex than operating a heat boiler, investing in CHP projects will increase the risk of disrupting production. In addition, in most cases, the companies concerned, in particular in the industry, will have to invest into the CHP installation on top of a heat boiler that is needed to ensure security of energy supply in case the CHP installation is out of order or at times of maintenance. Companies would normally require higher rates of return to compensate for the additional risk.

(135) Germany submitted several surveys of businesses and industrial plants confirming that in Germany many undertakings only accept relatively short payback periods, between 2 and 5 years.

[39] In the case of short reference periods (up to five years), the rate roughly corresponds to 1 divided by the payback period.

Figure 4 – Payback period, projected total expenditures and financing sources - Source GfK 2014 / GfK EEDL *Monitor / Ergebnisbericht November 2014*

Total/Subgroup: Planners of efficiency measures, weighted average, excluding no replies, in %.



Projected total expenditures	%
Under 10 000 €	23
10 000 to 25 000 €	25
25 000 to 50 000 €	24
50 000 to 100 000 €	10
100 000 to 500 000 €	17
Above 500 000 €	10

Financing source	%
From liquid means	71
Subsidies	39
Credits	27

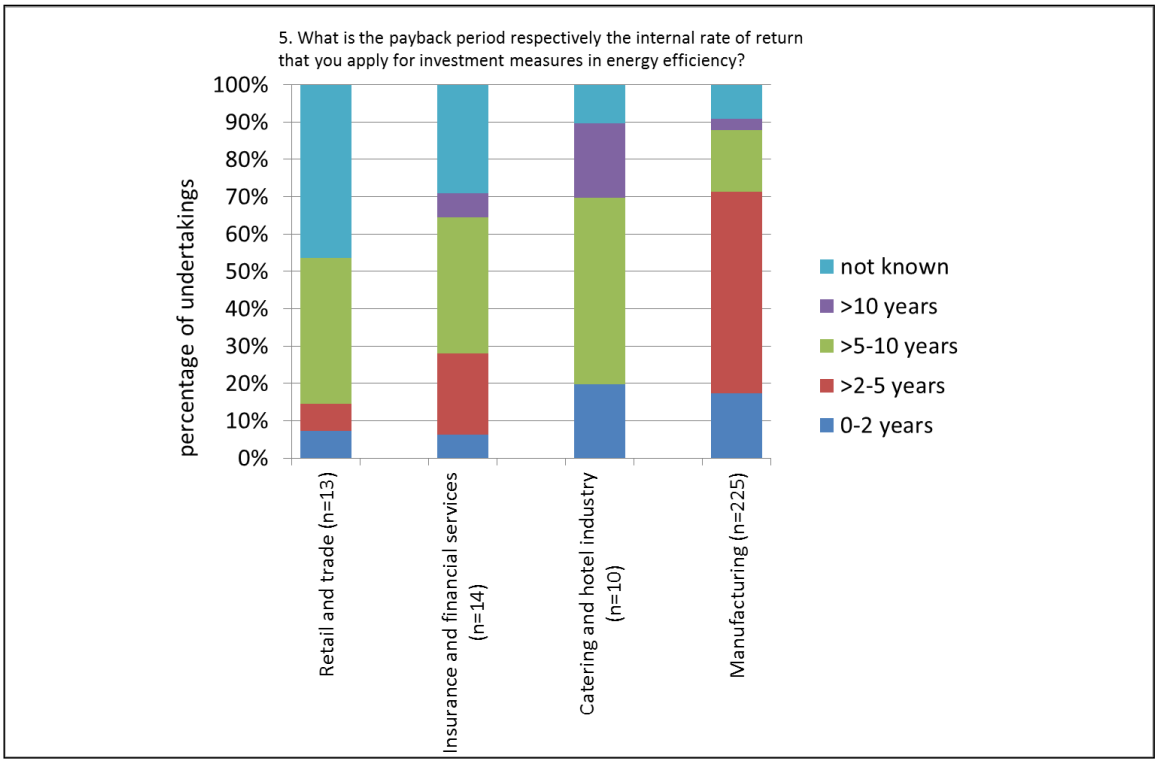
Basis: n= 963/474 (not weighted)

F4.1: In which period of time should costs linked to energy efficiency measures be paid back?

F4.2: What total expenditures are you planning in the next 2 years for measures aimed at increasing the energy efficiency of your company?

F4.3: How will you most likely finance the measures?

Figure 5 – Payback periods and rates of return of energy-saving investments - Source Prognos, IFEU, HWR Marktanalyse und Marktbewertung im Bereich Energieeffizienz [40]



[40] The participants to the survey have been asked which payback period they apply to investments into energy efficiency measures. They had the choice between the following categories: 0-2 years; 2-5 years, 5-10 years, 10 years, "don't know".

(136) In 2015, the Association of Industrial Producers of Electricity (*Verband der Industriellen Energie- und Kraftwirtschaft e.V. – VIK*) conducted a survey of its member companies on the issue of the profitability requirements for CHP projects. The following table presents the replies to the question: *'What is your company's maximum acceptable payback period for projects in the field of energy supply, in particular the building or modernisation of plants for combined heat and power generation (CHP plants)?*'

Table 35 - Maximum acceptable payback periods

Industry	Max. accepted payback period (in years)
Food (1)	3
Food (2)	3.5
Paper 1	3
Paper 2	3.5
Chemistry 1	3
Chemistry 2	3.5
Metalworking (non-iron)	4
Metalworking (iron)	2

(137) Germany also referred to a study commissioned by the Commission on Energy Efficiency and Energy Saving Potential in Industry from possible Policy Mechanisms.[41] This study projected 2 output scenarios: a high and a low hurdle rate scenario. For the high hurdle rate scenario, the study uses a 2-year simple payback criterion as it has observed that this payback period represents a closer perspective of what industry might consider economically feasible. The study used a 5-year payback period in the lower hurdle rate scenario as projects with that longer payback period were often shortlisted but not implemented.

(138) Finally, Germany made a survey among CHP project owners. This survey showed that projects with a short payback period of 2 to 3 years (corresponding to a 50% to 33% rate of return) are realised while projects with payback periods above 4 years (25% rate of return) tend to be abandoned – as shown below in Table 36.

[41] Study delivered by ICF Consulting Limited, December 2015, in the framework of Contract No. ENER/C3/2012-439/S12.666002, p. 6.

Table 36 - Analysis of CHP projects in the industry - Source: non-public information by several planners

Industrial sector	Type of CHP	Electricity capacity	Thermal capacity	Was the project implemented?	Pay-back period
		kW	kW		Years
Manufacturing	Natural gas motor	[…]	[…]	Yes	2.0
Research	Natural gas motor	[…]	[…]	Yes	2.2
Logistics Centre	Natural gas motor	[…]	[…]	No	2.3
Research and development	Natural gas motor	[…]	[…]	Yes	2.6
Manufacturing	Natural gas motor	[…]	[…]	Yes	2.7
Motor vehicle manufacturers	Natural gas motor	[…]	[…]	Yes	3.0
Manufacturing	Natural gas motor	[…]	[…]	Yes	3.5
Automotive component manufacturers	Natural gas motor	[…]	[…]	Yes	3.5
Pharma	Natural gas motor	[…]	[…]	Yes	4.0
Automotive component manufacturers	Natural gas motor	[…]	[…]	No	4.5
Chemistry	Natural gas motor	[…]	[…]	Yes	4.5
Manufacturing	Natural gas motor	[…]	[…]	Possibly	4.5
Chemistry	Natural gas motor	[…]	[…]	No	5.0
Pharma	Gas turbine	[…]	[…]	No	5.1
Pharma	Natural gas motor	[…]	[…]	No	5.7
Food	Natural gas motor	[…]	[…]	Yes	6.0
Food	Gas turbine	[…]	[…]	Yes	8.0
Electroplating	Natural gas motor	[…]	[…]	No	8.0
Pharma	Natural gas motor	[…]	[…]	No	8.0
Manufacturing	Natural gas motor	[…]	[…]	No	8.5
Chemistry	Gas turbine	[…]	[…]	No	9.0

[...]: Business secret; the information concerns concrete individual projects and the combination of the sector, the electrical capacity and thermal capacity could allow identification of the projects and give insight into production costs of companies.

(139) Germany also observed that CHP projects of more than 100 kWel implemented in the non-electro-intensive industry and used 100% for self-consumption generally yield rates of return of more than 30% without support. Those categories are excluded from support under the KWKG.

(140) Finally, Germany has explained that, in the case of contracting, the LCOE calculations have made use of the same discount rate as if the project had been implemented by the consumer directly. The reason for this is that contractors themselves require lower rates of return because energy production and supply to third parties is their main business. However, a consumer will engage into energy contracting only if this yields certain savings for him. If the savings are too low,

he will abandon the project altogether or implement it himself directly (without resorting to the *Contractor*). This means that the project itself must yield both savings for the consumer and a reasonable rate of return for the contractor. In other terms, the rate of return of the project is spread between the contractor and the consumer.

2.7. Monitoring of production costs of CHP installations

(141) Production costs are examined on a yearly basis. Thereby, the Federal Ministry for Economic Affairs and Energy verifies that the support level is adequate and does not exceed the difference between production costs of CHP electricity and the market price for the electricity. Should there be indications that the support level would exceed that difference, the Federal Ministry for Economic will inform the Parliament by 31 August of the relevant year and introduce an amendment to the law if need be (see §34(1) KWKG).

(142) As regards the discount rates used in the LCOE calculations (see recitals (128) and following) and for the determination of the bid caps in the general CHP tenders (see recital (50)) and the iKWK tenders (see recital (73)), Germany has committed to commission and publish an independent study, before the end of 2022, to determine whether the discount rates are still appropriate based on empirical evidence and where possible using counterfactual impact evaluation methodologies. Germany provided an outline of several data sources and methodologies for analysing the discount rates. The analysis will be based on an assessment of the project returns of implemented/funded CHP projects, which will be compared with the returns of unfunded or non-implemented CHP projects as control group (if data are available), as well as with industry returns obtained from literature research. This analysis will be complemented by other methods such as interviews, analysis of the expected returns of investment decisions in the industry (based on indicators as the weighted average cost of capital, ("WACC")), etc. If they need to be updated, Germany commits, in order to ensure that no overcompensation occurs:

(a) to adapt the levels of the general CHP support and innovative RES-heat bonus described in sections 2.2.1.2. and section 2.2.2.2.

(b) to adapt the bid caps mentioned in recital (50) and (73).

(143) Germany commits (i) to investigate if the guarantees of origin mentioned in recital (121) pursuant to article 14 (10) of the Energy Efficiency Directive are exchanged at a price and (ii) if that is the case, to immediately include this revenue in the production costs and (iii) adapt the support levels, if needed, to avoid any overcompensation.

2.8. CHP surcharge reductions for hydrogen producers

(144) In § 27 the KWKG 2020 foresees special provisions for undertakings belonging to the sector 'manufacture of industrial gases'[42] in which the production of

[42] Number 78 in Annex 4 of the EEG 2021 and equivalent to NACE code 2011 listed in Annex 3 of the EEAG.

hydrogen contributes to the majority of their total value added[43]. The KWKG 2020 limits the amount of the surcharge that can be recovered from hydrogen producers, if they benefit from a reduced renewables surcharge in line with the Renewable Energy Sources Act (EEG 2021)[44]. The specific conditions from which hydrogen producers would benefit, differ in parts from the conditions from which other energy-intensive users benefit under the scheme approved by the Commission in the 2017 decision on the reduced CHP surcharges[45].

(145) Contrary to other energy-intensive users, hydrogen producers would pay 15% of the CHP surcharge as of the first GWh of electricity consumed, whereas other energy-intensive users pay the full CHP surcharge on the first GWh and receive a reduction only on the remainder of the electricity consumed. As is the case for other energy-intensive users, hydrogen producers will not pay more than 0.5% of their gross value added ('GVA') over the last 3 years if they have an electro-intensity of at least 20% and the surcharge will not amount to less than 0.03 cent per kWh for the electricity consumed above the first GWh[46].

(146) Germany explained that the specific provisions for undertakings producing hydrogen aim at the market ramp-up of the technology and ensuring their international competitiveness. Contrary to other established markets in the industrial gases sector, there are currently no dedicated industrial production facilities for the electrolytic production of hydrogen. The possibility of obtaining a reduction on the CHP surcharge from the first GWh aims at encouraging the potential development of the uptake of the technology also by smaller actors.

2.8.1. Technical provisions

(147) The GVA is established at factor costs, without deducting costs for outsourced personnel[47].

(148) Electro-intensity is defined in line with the relevant provisions of the EEG as the ratio between the electricity costs and the arithmetic mean of the GVA over the last three full accounting years. The relevant electricity costs include the electricity costs for own consumption that are subject to the CHP and EEG surcharge in accordance with §61 EEG 2021. If an undertaking does not reach the required electro-intensity to benefit from the reduced CHP surcharge due to electricity it consumes which is in principle not subject to the surcharge, it can

43 By reference to § 64a of the EEG 2021. The provisions apply to undertakings which are classified as hydrogen producers and § 64a (5) foresees that this also applies to independent parts of undertakings, which is part of Germany's notification. On the other hand, § 64a (6) of the EEG 2021 also foresees that these provisions apply to non-independent parts of undertakings. This was not notified to the Commission and falls outside of the scope of this decision. The current decision does not, therefore, take any position on potential reductions from the CHP surcharge for non-independent parts of undertakings.

44 § 27 (1) of the KWKG 2021 with reference to § 63 (1)a in combination with § 64a of the EEG 2021.

45 Commission Decision of 23.5.2017 on State aid SA.42393 (2016/C) (ex 2015/N) implemented by Germany for certain end consumers (reduced CHP surcharge) and SA.47887 (2017/N) which Germany is planning to implement in order to extend the CHP support scheme as regards CHP installations used in closed networks, OJ L 258, 06.10.2017, p. 127.

46 § 27 (1) of the KWKG 2021. Germany informed the Commission that the 1 GWh threshold will be deleted and that the 0.03 cent per kWh threshold will be applicable to all electricity consumed.

47 § 64 (6) point 2 of the EEG 2021.

add these electricity volumes to reach the energy-intensity level, if it subsequently pays the reduced CHP surcharge on them.

(149) The relevant electricity costs correspond to the undertaking's assumed electricity consumption multiplied by the assumed electricity price. The assumed electricity consumption corresponds to the arithmetic mean over the last 3 closed accounting years or based on consumption efficiency benchmarks to be established by the Ministry of Economic Affairs and Energy in accordance with §94 (1) EEG 2021. The assumed electricity price corresponds to the average retail electricity price applying to undertakings with a similar level of electricity consumption to be established by the Ministry of Economic Affairs and Energy in accordance §94 (2) of the EEG 2021[48].

2.9. Entry into force of the KWKG 2020 and duration

(150) According to article 10 of the coal exit law, the changes to the KWKG adopted in the coal exit law and the EEG 2021 will only enter into force after the approval by the Commission. The EEG 2021 also inserts a suspensive clause in the KWKG (see §35(19)), which makes the prolongation of the support to electricity from CHP (see section 2.2), to district heating and cooling networks (see section 2.5) and to heat and cooling storage facilities (see section 2.4) beyond 31 December 2026 and the introduction of the PtH bonus conditional on an approval under State aid rules.

(151) According to § 35 (17) sentence 1 KWKG, the amended provisions apply to installations which have entered into service after the entry into force of the CHP reform. By way of derogation, pursuant to §35 (17) sentence 2 of the KWKG, certain provisions are to be applied retroactively from the entry into force of the rules also to CHP plants which started to operate on a permanent basis after 31 December 2019. This concerns, on the one hand, the doubling of the support rate for small CHP plants while at the same time halving the duration of the support (see recital (64) above), the annual limitation of eligible full use hours (see recital (27)), the new requirements for the promotion of heat networks (see recital (108)).

(152) Germany has notified the prolongation and modification of the support measures as described in sections 2.2, 2.4 and 2.5 for a period until 31 December 2026. Nevertheless, as regards the support described in section 2.2, Germany indicates that the national evaluation of the scheme carried out in 2022 will determine if CHP installations with a capacity below or equal to 50 MW should continue being granted aid after 31 December 2025 to meet the objective described in recital (14) (see §6(1) KWKG).

(153) The support described in section 2.3 has stopped being granted as of 31 December 2019, in line with the 2016 decision.

[48] § 64 (6) point 3 of the EEG 2021.

2.10. Transparency of the aid, firms in difficulty or subject to an outstanding recovery order

(154) Germany has committed to the transparency requirements of section 3.2.7 of the EEAG and has indicated that the information can be found on the following website:
https://webgate.ec.europa.eu/competition/transparency/public/search/home/

(155) Germany has committed not to grant aid to firms in difficulty as defined by the applicable Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty[49], with the exception of undertakings which were not in difficulty on 31 December 2019 but became undertakings in difficulty in the period from 1 January 2020 to 30 June 2021.

(156) Germany has committed to suspend the award and/or payment of any aid under the notified aid scheme to any undertaking that has benefitted from earlier unlawful aid declared incompatible by a Commission Decision (either as an individual aid or an aid under an aid scheme being declared incompatible), until that undertaking has reimbursed or paid into a blocked account the total amount of unlawful and incompatible aid and the corresponding recovery interest.

2.11. Evaluation of the scheme

(157) In July 2020, Germany modified the CHP law (KWKG 2020). The previous CHP scheme under the KWKG 2016 was approved until the end of 2022, and an evaluation report was due in 2021.

(158) Germany notified the modified and prolonged CHP scheme for a period of six years (until 31 December 2026). As a consequence, the evaluation of the KWKG 2016 was advanced in time and Germany provided an evaluation report of the KWKG 2016 on 6 November 2020 ('2020 evaluation report')[50].

(159) The evaluation plan of the KWKG 2016 included 23 evaluation questions aiming at assessing different aspects of the aid scheme, including direct and indirect effects, proportionality and appropriateness of the instrument. Most of the evaluation questions were foreseen to be answered via descriptive statistics and qualitative evidence, while for others the qualitative evidence was foreseen to be accompanied by quantitative evidence and analysis.

(160) The 2020 evaluation report is well structured and it presents a detailed description and analysis of the scheme. The report finds that the direct and indirect objectives of the support measure will be achieved, and that the CHP production supported by the scheme resulted in higher emission savings compared to the uncoupled production variants (producing power and heat separately). However, the Commission notes that these results were obtained through merely descriptive statistics and qualitative analysis.

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49 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).

50 Öko-Institut e.V. (21 October 2020), "*Evaluierung des Kraft-Wärme-Kopplungsgesetzes*".

(161) Regarding the data, the 2020 evaluation report does not contain any quantitative analysis since high-quality data on CHP were not available. The report relies on data and information provided by the Federal Office for Economic Affairs and Export Control ('BAFA') and other publicly available energy statistics. These data have their limitations as they are general in nature and limited in scope (e.g. limited to the manufacturing sector). Since 31 January 2019, the Marktstammdatenregister ('MaStR'), a universal database of all electricity generation plants (including CHP plants) in operation in Germany, has been set up. However, the report mentions some difficulties with the use of the data on CHP plants in the MaStR. For instance, data on CHP plants that entered into operation before February 2019 were still missing or incomplete, so that any reconciliation with other data sources, such as the annual CHP report of the BAFA, is impossible. In addition, only data on installations which received support under the KWKG 2016 are available for evaluation by the BAFA, while data on other CHP installations which are not (anymore) covered by CHP support, are not available. Therefore, the report states that it is not possible to compare CHP installations which obtained support with those who do not, neither the performance of CHP installations before and after the support. Finally, the report underlines the need of improving the data collection on CHP, for instance by relying on information provided by other authorities such as the Federal Statistical Office, the Electricity tax authority, etc.

(162) Regarding the methodology, the 2020 evaluation report discusses the methods that theoretically could be applied in order to assess the direct (causal) impact of the aid (as foreseen in the evaluation plan of the KWKG 2016). Nevertheless, no counterfactual analysis has been performed due to the lack of data, in particular a relevant control group consisting of unsubsidised CHP plants could not be established (since virtually all CHP plants were eligible for support). As a consequence, conclusions are derived from descriptive statistics and qualitative assessments, and should therefore be interpreted with caution.

(163) While the 2020 evaluation report thus has severe shortcomings, the KWKG 2016 evaluation plan mentioned upfront possible problems related to data availability, and the final report was originally only due by mid-2021. Therefore, the Commission considers that the 2020 report can serve as an interim evaluation report, setting out the problems with data collection and methodologies encountered during the previous evaluation exercise. For approving the revised CHP law, the Commission notes however that the evaluation plan, as well as report, for the KWKG 2020 should be updated and improved as compared to the evaluation of the KWKG 2016.

(164) Germany has committed to submit the final evaluation report on the KWKG 2020 to the Commission by 31 March 2026. In order to keep the Commission updated about the progress of the evaluation in terms of data collection and methodologies (including potential difficulties encountered), an interim evaluation report is due in 2022. Germany also committed to carry out a study on the discount rates used in the LCOE calculations for the administratively set fees and the calculation of the bid caps in the short term, and included this study in the revised evaluation plan for the KWKG 2020. This study will also be delivered in 2022.

(165) The evaluation plan notified by Germany in the context of the KWKG 2020 includes again 23 evaluation questions in order to assess the scheme's outputs and

its direct effects on the beneficiaries (developments in the production of energy from CHP installations, installed capacity and investment in energy from CHP installations, compared to a counterfactual of no aid), its indirect effects (in particular, its contribution to the reduction of CO2 emissions and its impact on market concentration), as well as the proportionality of the aid and the appropriateness of the chosen aid instrument. In addition to the general evaluation questions, sub-sets of questions will address technology-specific elements. The main new features are the reduction of tendered quantities in case of undersubscription, a lower tender participation threshold (500 kW instead of 1 MW), the introduction of the innovative RES-heat bonus and a modified coal-switch bonus.

(166) Evaluation questions related to the general outputs of the scheme will be primarily answered by providing quantitative evidence, while other questions may require qualitative assessment. To evaluate the direct effects of the scheme, Germany has committed to further extending the methodology used so far in the evaluation reports by employing, to the extent possible given data availability, counterfactual impact evaluation methods in line with the Commission Staff Working Document on Common methodology for State aid evaluation[51].

(167) Germany submitted an overall plan to improve the data collection, with several objectives in the short, middle and long run. General energy statistics will also be used, as well as some targeted qualitative information, ad hoc studies and surveys. Moreover and in particular in relation to the tender bid information, the German authorities will provide the independent evaluator with the necessary data for conducting the evaluation in full respect of data protection rules and while ensuring protection of business secrets and sensitive information. In this way, the problem encountered during the previous evaluation, whereby not sufficient data was available in order to answer all evaluation questions can be avoided. Germany also committed to make use of data from the KWKG 2016 projects in order to have sufficient data points to carry out the quantitative analysis.

(168) The evaluation will be conducted by an external independent evaluator to be selected through an open tender procedure. Germany has committed to duly consider the relevant experience of the tender applicants notably in the field of quantitative evaluation methods.

(169) The evaluation report will be published on the website of the German Ministry for Economic Affairs and Energy. According to Germany, the evaluation results will be duly taken into account by the relevant authorities for future policy-making.

2.12. The financing mechanism and the budget

(170) For each measure described in section 2 above the relevant network operator has the legal obligation to pay the support provided for by the law.

(171) The operator of the CHP installation is entitled to the payment mentioned in recital (23) or (24) from the network operator to whose network their CHP

[51] Commission Staff Working Document on Common methodology for State aid evaluation, Brussels, 28.5.2014, SWD(2014) 179 final.

installation is directly or indirectly connected (see §6(1) KWKG for the general CHP support, §7a(1) and (3) KWKG for the innovative RES heat bonus, §7c(1) KWKG for the coal-switch bonus).

(172) The operator of a heating/cooling network is entitled to the payment of the support described in section 2.5 above from the TSO whose control area includes the network to which the cogeneration installation feeding into the heating/cooling network is directly or indirectly connected. Where several CHP plants are connected to the heating/cooling network, the responsibility lies with the TSO whose control area includes the grid to which the CHP plant with the highest electrical cogeneration output is connected (see §18(1) and (3) and §21 KWKG).

(173) Similarly, the operator of a heating/cooling storage facility is entitled to the payment of the support described in section 2.4 above from the TSO whose control area includes the grid to which the CHP installation feeding into the new heat/cooling storage facility is directly or indirectly connected. Where several CHP plants feed into the new heat/cooling storage facility, the responsibility lies with the TSO, whose control area includes the grid to which the CHP plant with the highest electrical cogeneration output is connected. (see §22(1) and (3) and §25 KWKG).

(174) Network operators are then entitled, but not obliged by law, to include the costs of the expenditures required under the KWKG as a surcharge in the calculation of network charges (CHP-surcharge) (see §26(1) KWKG). Network operators have to keep separate accounts in respect of the collected CHP-surcharge (see §26(3) KWKG). Deviating from this, the TSOs are entitled to levy the reduced surcharge from energy-intensive users including hydrogen producers as a separate surcharge (see §27(2) KWKG).

(175) The amount of the CHP-surcharge is calculated each year by the TSOs as a uniform rate per kWh of electricity consumed. Some categories of users benefit however from a reduced rate established in accordance with the CHP law (see the Commission Decision on aid schemes SA.42393 (2016/C) (ex 2015/N) implemented by Germany for certain end consumers (reduced CHP surcharge) and SA.47887 (2017/N) extension of the CHP support scheme as regards CHP installations used in closed networks[52]).

(176) In order to make sure that each network operator can be compensated for the extra costs resulting from its compensation obligation, the CHP law organizes a system by which the burden resulting from the purchase and compensation obligations is spread evenly between network operators in proportion to the consumption of consumers connected to their network. This burden is then compensated in the same way through the CHP-surcharge (which is proportionate to the consumption in their respective network, as well) (see §28 KWKG). This system can be summarized as follows:

[52] See Commission Decision in State aid SA.42393 (2016/C) (ex 2015/N) implemented by Germany for certain end consumers (reduced CHP surcharge) and SA.47887 (2017/N) which Germany is planning to implement in order to extend the CHP support scheme as regards CHP installations used in closed networks, OJ L 258, 06.10.2017, p. 127.

(a) all distribution network operators can require full compensation of their extra-costs from their respective transmission network operator;

(b) transmission network operators balance the financial burden out between themselves in such a way that each of them bears the same burden in proportion to the consumption of end consumers (directly or indirectly) connected to their grid; then

(c) transmission network operators transfer part of the financial burden back to distribution network operators in such a way that each network operator (be it distribution or transmission) bears the same financial burden in respect of the consumption of the consumers directly connected to their grid.

(177) §26a KWKG establishes the methodology to be used by transmission network operators to calculate the CHP-surcharge. TSOs have to publish the CHP-surcharge for the following calendar year on their websites by 25 October (see §26b KWKG).

(178) The KWKG sets a yearly limit to the budget of the scheme and hence the total CHP-surcharge (§29 KWKG "*Begrenzung der Höhe der KWKG-Umlage und der Zuschlagzahlungen*"). The yearly amount of support paid to CHP installations, storage facilities and district heating/cooling networks under the KWKG may not exceed EUR 1.8 billion. Of this amount, the yearly support for heating/cooling storage facilities and district heating/cooling networks may not exceed EUR 150 million, except if estimates indicate that the total budget of 1.8 billion will not be exhausted. Once the maximum budget has been reached, further storage or district heating/cooling projects will obtain authorisation in the following year.

(179) If on the basis of the estimates used to determine the level of the CHP-surcharge, it is established that the EUR 1.8 billion budget will be exceeded in year X+1, the support for all CHP installations of more than 2 MW of installed capacity will be reduced in the same proportion. Transmission system operators will have to warn the BAFA when they observe a risk of the budget being exceeded. The BAFA will then by rule of proportion determine the reduced support rates and publish them (see §29 (4) KWKG). This reduction will be compensated in the following years.

2.13. Third party submissions

2.13.1. Description of submissions

(180) The Commission received a number of spontaneous third party submissions, including submissions from Greenpeace Energy and an anonymous party, which were forwarded to Germany (see recital (7) above). The main allegations of the third parties are summarised below.

(181) Some third parties indicate that the new coal-switch bonus appears disproportionate because of the use of a profitability factor (30%) to calculate the bonus, which may be questionable under current market conditions. Some also

refer to the fact that the draft coal-exit law[53] provided for a uniform bonus of 180 EUR/kW, while the final coal-exit law adopted by Parliament in July 2020 provides for a bonus which can go up to 390 EUR/kW.

(182) Some third parties criticise the possibility to cumulate payments for closing down hard-coal and lignite power plants under the coal exit law (tender mechanism and negotiated procedure), with the new coal switch bonus. They consider that some undertakings could benefit from an over-compensation combining both measures, since cumulation rules would be unclear.

(183) Some third parties consider that the new coal-switch bonus is not needed because some coal-fired CHP would already make losses while the CO_2 prices will continue increasing.

(184) Some third parties consider that the new coal-switch bonus has no incentive effect, since, according to §7(c) KWKG, the new CHP installation must enter into operation "at the earliest after 1 January 2016".

(185) Some third parties consider that the new coal switch bonus does not guarantee the reduction of emissions, while the general CHP support is more generous for fossil-fuel based installations. In particular, CHP installations using biomethane and already supported via the EEG scheme are excluded from the CHP scheme (see §1(3) KWKG). This exclusion would be incompatible with point 7 of the EEAG read in conjunction with article 4 (4) of the Renewable Energy Directive[54], which would oblige Member States to avoid implementing any energy policy which might negatively affect the profitability of RES installations already financially supported in the past.

2.13.2. Replies from the German authorities

(186) As regards the proportionality of the new coal switch bonus, Germany indicates that some third parties refer to the previous version of the bonus, as presented in the draft law, while the final version of the bonus is different: the level of the bonus has been adjusted not to be higher than the calculated foregone profits for each category of CHP installations. Furthermore, Germany indicates that the foregone profits of coal-fired CHP installations have been calculated using a discount rate of 6% (usual for municipal utilities (*Stadtwerke*)) and not of 30%.

(187) As regards the alleged lack of incentive effect, Germany indicates that the reference to 1 January 2016 is not relevant because of the general transitional provision clause in § 35 (17) KWKG, according to which the new coal switch bonus only applies to CHP installations which have entered into operation after 13 August 2020. Moreover, Germany indicates that, to receive the new coal switch bonus, the new CHP plant must start operating on a permanent basis no later than 12 months after the end of operation of the old plant.

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53 https://www.bmwi.de/Redaktion/DE/Downloads/G/gesetzentwurf-kohleausstiegsgesetz.pdf?__blob=publicationFile&v=8

54 Directive 2018/2001/EU 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 L328, 21.12.2018, p.82).

3. GERMANY'S VIEWS ON THE QUALIFICATION OF THE MEASURE AS STATE AID

(188) Germany has indicated that it has notified the measures described in section 2. above for legal certainty since Germany has stated the view that these measures do not constitute State aid for the reasons set out below. In case the Commission would find the measures to constitute State aid, Germany submits that they would in any event be compatible with the relevant rules.

3.1. Presence of State resources

(189) According to Germany, no State resources are transferred, as public authorities cannot dispose of the CHP surcharge.

(190) In its judgment of 28 March 2019, *Germany v Commission* (C-405/16 P)[55], the Court of Justice of the European Union ("the Court") ruled that the EEG 2012[56] did not constitute aid. Germany submits that as per the judgment, the EEG 2012 was imputable to Germany, however, that was not sufficient for any advantages for undertakings resulting from that act to qualify as 'aid' within the meaning of Article 107(1) TFEU. To qualify as State aid, the advantages must also be granted directly or indirectly through State resources, which it found not to be the case with the EEG 2012. In the absence of a direct obligation on final consumers to pay the EEG-surcharge, the resources in question were not State resources equivalent to a levy, nor were those resources subject to constant State control.

(191) According to Germany, this finding can be applied to the KWKG. Germany states that final consumers are not directly burdened with the CHP surcharge. On the contrary, network operators are obliged to bear the costs of the CHP support. § 26 of the KWKG grants network operators the right to include the costs of the expenditure required by that law as a surcharge. However, there would be no legal obligation to do so, like in the EEG 2012. Germany therefore considers that the KWKG does not use State resources and therefore it would not entail State aid.

(192) Germany indicates that the CHP support has a legal basis which defines how the funds must be used. However, according to Germany, like in the EEG 2012, the funds would be managed exclusively by the transmission and distribution system operators, without Germany being able to dispose of them. As in the EEG 2012, Germany considers that neither transmission nor distribution system operators are controlled by the State. They would only be controlled by the public authorities (the BNetzA and the BAFA) to ensure that they implement the KWKG correctly. According to Germany, as in the EEG 2012, the resources of the KWKG would not be under constant State control.

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55 Judgment of 28 March 2019, *Germany v Commission*, C-405/16 P, EU:C:2019:268 ("the EEG 2012 judgment").

56 Law revising the legal framework for the promotion of electricity production from renewable energy adopted on 28 July 2011 ("the EEG 2012").

3.2. Existence of a selective advantage

(193) According to Germany, the KWKG supports operators of CHP installations, heating or cooling networks, heating or cooling storage facilities. The support would not exceed the long-term LCOE and therefore would not result in a financial advantage exceeding the costs, including a reasonable profit margin. Support would be available to all potential plant operators in Germany, provided that the projects meet the requirements of the KWKG. Germany therefore considers that there would be no discrimination between individual actors nor a related competitive advantage in the electricity market.

3.3. Distortion of competition and trade within the EU

(194) According to Germany, the measure would not affect competition in the internal market. Heat supply would technically be local and long-distance cross-border heat transport not be economically and environmentally viable. In the electricity market, support would be so limited that market participation of subsidised installations below market prices would not be economically viable. The LCOE would not be exceeded by aid and market revenues. In the merit order of the electricity market, the promotion of cogeneration could lead to a shift, so that cogeneration based on gas can take place before uncoupled production from coal and gas. This shift would be desirable for reasons of environmental protection and is the objective of the measure. According to Germany, this would not lead to a territorial distortion of competition. Access for European operators would be possible on a non-discriminatory basis, provided that the legal conditions are met.

(195) From a territorial point of view, the support would be limited to CHP installations in the territory of Germany. However, according to Germany, as support and market price do not exceed the LCOE, there would be no distortion of competition in the European electricity market. The tenders for CHP installations would provide for an opening to CHP installations in other Member States. However, in the absence of a bilateral agreement between Germany and another Member State, no such opening has taken place yet.

4. ASSESSMENT OF THE MEASURE

4.1. Existence of aid

(196) Article 107 (1) TFEU provides 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"*.

(197) In determining whether a measure constitutes State aid within the meaning of Article 107(1) TFEU, the Commission therefore must assess whether the measure (i) confers an advantage on certain undertakings or certain sectors (selective advantage); (ii) is imputable to the State and involve State resources; (iii) distorts or threatens to distort competition; and is liable to affect trade between Member States.

(198) The Commission considers that the notified measures (i.e.

(a) the support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations, as described in section 2.2;

(b) the support to energy-efficient district heating/cooling networks, as described in section 2.5;

(c) the support to heat/cooling storage facilities, as described in section 2.4;

(d) the support to the production of CHP electricity in existing (depreciated) highly efficient gas-fired CHP installations in the district heating sector, as described in section 2.3; and

(e) the reduced CHP surcharge levied on hydrogen producers, as described in section 2.8,

entail State aid within the meaning of Article 107(1) TFEU for the reasons set out in sections 4.1.1 to 4.1.3 below:

4.1.1. Selective advantage

(199) In contrast to Germany's view (see recital (192)), the Commission considers that a financial advantage not exceeding the long-term LCOE, including a reasonable profit margin, can still amount to an advantage even if available to all potential plant operators in Germany.

(200) An advantage, within the meaning of Article 107(1) TFEU, is any economic benefit which an undertaking could not have obtained under normal market conditions, that is to say in the absence of State intervention.[57] Whenever the financial situation of an undertaking is improved as a result of State intervention on terms differing from normal market conditions, an advantage is present. Not all measures which favour economic operators fall under the notion of aid, but only those which grant an advantage in a selective way to certain undertakings or categories of undertakings or to certain economic sectors.

(201) For CHP installations (recital (197) letter (a) and (d)), the aid takes the form of a premium that producers of CHP electricity obtain either in addition to the market price of the electricity they sell on the market or for the electricity they have used for their own consumption. The aid also takes the form of bonuses coming in addition to the premium (see recitals (76) and (79)). The premium and the bonuses are non-reimbursable and guarantee CHP electricity producers revenues higher than the market price and therefore constitute an advantage that operators would not have obtained under normal market conditions. Contrary to Germany's position, ensuring to the CHP operators a return in line with the LCOE, plus a reasonable profit margin, entails an advantage that they would not have without the measure.

(202) The aid, in the form of premiums and bonuses, is also selective given that it is granted only to a certain sub-sector (CHP electricity production) or for the autogeneration of CHP electricity in certain sectors only (autogeneration in CHP installations of not more than 100 kW and autogeneration in certain electro-

[57] Judgment of 11 July 1996, *SFEI and Others*, C-39/94, EU:C:1996:285, paragraph 60; Judgment of the Court of 29 April 1999, *Spain v Commission*, C-342/96, EU:C:1999:210, paragraph 41.

intensive manufacturing sectors, see recital (61) above) and is not accessible for the other electricity producers or other sectors of the economy. To that end, contrary to Germany's view (see recital (192)), the measure is selective

(203) In the case of heat/cooling storage installations (recital (197) letter (c)), and district heating/cooling networks (recital (197) letter (b)), the aid takes the form of a direct grant covering part of the investment costs, which therefore constitutes an advantage that the operators would not have obtained on the market. It is also selective as it favours only certain sectors (i.e. the district heating and/or district cooling sector and, for the aid to storage facilities, which are meant to be connected to CHP installations, the aid beneficiaries are the CHP electricity operators themselves or also the providers of storage services).

(204) To establish whether the reduced CHP surcharge for hydrogen producers (recital (197) letter (e)) is selective and thus potentially constitutes a selective advantage it needs to be established whether it constitutes a derogation from a reference system, insofar as it differentiates between economic operators who, in light of the objectives intrinsic to the system, are in a comparable factual and legal situation. Finally, it would need to be established whether the derogation is justified by the nature or the general scheme of the (reference) system[58]. Should there be no such justification, the measure can be considered to be selective.

4.1.1.1. Identification of the reference system and of the normal charge principle

(205) The reference system with regard to the CHP surcharge is that the surcharge is uniform per kWh of electricity consumed by each end consumer (full CHP surcharge). It serves to cover the difference, for electricity suppliers, between the costs resulting from the support for CHP and the revenues. The TSOs are entitled to claim the CHP surcharge directly from electricity suppliers. They are also entitled to claim the CHP surcharge from final consumers on the electricity that is not supplied to them by electricity suppliers but is either self-supplied or supplied by a third party other than an electricity supplier (see recitals (173) *et seq*.).

(206) In addition, the purpose of the surcharge is to finance the support for the production of CHP. The KWKG explicitly states that it aims to increase CHP to 120 TWh by 2025, thereby improving the country's energy efficiency and contributing to climate and environmental policy goals[59].

(207) On this basis, it must be concluded that under the CHP surcharge system the full CHP surcharge expressed in cents per kWh is in principle to be levied equally on each kWh of electricity consumed. The Commission therefore concludes that this is the system of reference to be taken into account for the assessment of selectivity of the reduced CHP surcharge for hydrogen producers.

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58 See, for instance, Judgment of the Court of Justice of 8 September 2011, *Commission v Netherlands*, C-279/08 P, ECLI:EU:C:2011:551, paragraph 62; Judgment of the Court of Justice of 8 November 2001, *Adria-Wien Pipeline*, C-143/99, ECLI:EU:C:2001:598.

59 §1(1) of the KWKG.

4.1.1.2. Deviation from the Reference System

(208) The reduced CHP surcharge for hydrogen producers is a deviation from the full CHP surcharge. The CHP surcharge which hydrogen producers have to pay is defined as a percentage of and by reference to the full CHP surcharge. It does not constitute another type of surcharge and constitutes a deviation from the reference system, as normally those end consumers would have been subjected to the full CHP surcharge. Hydrogen producers are in a comparable factual and legal situation with all other energy users subject to the CHP surcharge in light of the purpose of that system, which is the financing of combined heat and power generation in order to attain Germany's climate objectives and the spreading of the costs among all end consumers (see recitals (14) – (17) and (174)) .

4.1.1.3. Justification for the deviation from the reference system

(209) A measure which derogates from the reference system may still be found to be non-selective if it is justified by the nature or general scheme of that system. This is why it needs to be established whether undertakings benefiting of a reduced CHP surcharge do so as a result of the intrinsic basic or guiding principles of the reference system.

(210) As mentioned above, the KWKG rests on the principle that the full CHP surcharge is levied on all electricity consumed in Germany. The Commission does not consider that hydrogen producers would be in a different situation in the light of the purpose of the CHP surcharge system, which is the financing of CHP and the spreading of the costs among all end consumers, the ultimate goal being to contribute to the energy efficiency and reduction of CO_2 emissions in Germany. Hydrogen producers equally benefit from a more sustainable electricity supply in Germany in the same way as other final consumers which will be under the obligation of paying the full CHP surcharge. The Commission, therefore, considers that there is no justification inherent to the system for the deviation from the reference framework.

4.1.1.4. Conclusion on selective advantage of the reduced CHP surcharge

(211) The section above demonstrates that the reduced CHP surcharge for hydrogen producers deviates from the reference system and that there is no justification for the deviation that can be derived from the logic inherent to the system itself. The CHP surcharge reductions are therefore selective. The reduced CHP surcharges constitute an advantageous treatment of hydrogen producers compared to end-users having to pay the full CHP surcharge. The Commission concludes that the reduced CHP surcharge, therefore, constitutes a selective advantage for the hydrogen producers.

4.1.2. Imputability and existence of State resources

(212) For all the measures at hand (recital (197)), the advantage is granted by law (KWKG). Therefore, being a legal act adopted by the German Parliament, it is imputable to the State. In addition, the Commission observes that the BAFA (i.e. the Federal Office for Economic Affairs and Export Control, a superior federal

authority subordinated to the Federal Ministry for Economic Affairs and Energy (BMWi)) is in charge of verifying that only eligible operators obtain the support.

(213) The measures also use State resources. According to settled case law, measures which do not include a transfer of State resources may fall within the concept of 'aid', within the meaning of Article 107(1) TFEU[60]. Article 107(1) TFEU covers all the financial means by which public authorities may actually support undertakings, irrespective of whether or not those means are permanent assets of the public sector. Even if the sums corresponding to the aid measure concerned are not permanently held by the Treasury, the fact that they constantly remain under public control, and therefore available to the competent national authorities, is sufficient for them to be categorised as 'State resources'[61].

(214) The *PreussenElektra* case-law[62] distinguished between State aid measures and measures of mere price regulation. The latter measures consist, for example, in the State setting minimum or maximum prices for a good/service, which involves an intervention of the State ordering a direct transfer of resources from one private party of the transaction to another, but without involving State resources.

(215) The judgment *Germany v. Commission* mentioned by Germany (see footnote 55) further clarified the *PreussenElektra* case-law. The Court qualified the EEG 2012 as a measure of mere price regulation that did not involve State resources, given the absence of a mandatory levy to finance it. The Court rejected the relevance of a *de facto* levy stemming from the fact that, in practice, TSOs passed-on the EEG-surcharge to electricity suppliers and consumers. Instead, the Court made clear that a *de iure* levy (e.g. through an obligatory pass-on) would have been required for a finding that the burden born by the private TSOs in that case was financed through State resources. Nevertheless, the Court did not exclude the presence of State resources in cases where national rules impose a *de iure* mandatory levy. That interpretation was corroborated by the judgment in the *Achema* case[63].

(216) The Commission notes that contrary to the EEG 2012, the CHP electricity producers above 100 kW are obliged by law to sell their electricity directly in the market (see recital (24)) while electricity suppliers buy it. The price in this case is hence freely set by the market forces and not through price regulation. The network operators only have the obligation to pay the premium to the electricity

60 Judgment of 9 November 2017, *Commission v TV2/Danmark*, C-656/15 P, EU:C:2017:836, paragraph 43 and the case-law cited.

61 Judgment of 16 May 2002, *France v Commission (Stardust Marine)*, C-482/99, EU:C:2002:294, paragraph 37, and Judgment of 15 May 2019, *Achema and Others*, C-706/17, EU:C:2019:407, paragraph 53.

62 Judgments of 13 March 2011, *PreussenElektra*, C-379/98, EU:C:2001:160, paragraphs 58-62 and 66; 24 January 1978, *Van Tiggele*, C-82/77, EU:C:1978:10, paragraphs 24 and 25; 13 September 2017, *ENEA*, C-329/15, EU:C:2017:671, paragraph 37; and 28 March 2019, *Germany v Commission (EEG)*, C-405/16 P, EU:C:2019:268, paragraphs 56-60; 14 September 2016, *Trajektna luka Split v Commission*, T-57/15, EU:T:2016:470, paragraphs 26-30.

63 Judgment of 15 May 2019, *Achema and Others*, C-706/17, EU:C:2019:407. The measure at stake was a Lithuanian obligation to produce electricity from renewable sources (defined as SGEIs) and the compensation granted to the operators providing that SGEI. The Court concluded that the measure involved state resources because of two reasons: (i) the measure was financed by a levy imposed on final consumers and (ii) collected by a State-owned entity. The mere fact that the measure was financed by obligatory contributions from final consumers was sufficient for the Court to conclude on the existence of state resources.

producers on top of the market price (see recitals (23), (72) and (94)), and to pay the bonuses in addition to this premium (see recitals (76) and (79)). In other words, unlike in the EEG 2012, there is no obligation for the network operators to buy electricity from the producers at a certain price. In certain cases, the supported electricity is even consumed by the operator of the CHP installation itself directly or within a private network (see recital (61) above).

(217) The absence of any measure of price regulation is also clear as regards the support to heating and cooling networks (see section 2.5) and to storage facilities (see section 2.4). In all these cases, no purchase/sell transaction at a set price for a good/service takes place. The supported facilities remain in the ownership of the operator asking for the subsidy and the payment of the subsidy does not entitle the electricity network operators to any right in respect of the facilities concerned.

(218) Paying out complementary revenues to producers of cogenerated electricity that the network operators have not even purchased or to owners of district heating/cooling networks or heat/cooling storage facilities does not correspond to the normal task of electricity network operators[64]. Moreover, the network operators do not have any degree of contractual freedom in their relationship with the beneficiaries concerning setting additional eligibility conditions since all of them are set in the KWKG or the KWK-ordinance, and are verified by the BAFA (see recitals (55), (105) and (110)). Besides, the scale of financial support paid by the network operators to CHP beneficiaries is fully set by the State, either through tenders organised by the national regulator (see recitals (33) and (71)) or through other administrative procedures applied by the BAFA (see recitals (55), (105) and (110)). Furthermore, if the EUR 1.8 billion budget risks being exceeded, it is the BAFA and not the network operators who determines the reduced support rates and publish them (see recitals (177) and (178)).

(219) As provided for in the law (see recital (169)) and as recognised by Germany (see recital (190)), network operators are obliged to bear the costs of the support measures entailed in the KWKG. Consequently, the financial charge imposed by law on the network operators is a *de iure* mandatory levy imposed on them by the German State. The fact that, subsequently, network operators are only entitled (but not obliged) to charge those costs to their own customers (see recital (174)), simply means that the latter customers are not subject to a *de iure* mandatory levy. However, that does not alter the fact that network operators are subject to a *de iure* mandatory levy, since they are obliged under German law to bear the costs of the support measures entailed in the KWKG. The financing of support from a *de iure* mandatory levy on one level of the supply chain is sufficient to establish the involvement of State resources, without it being necessary to identify a further *de iure* mandatory levy also at a subsequent level of the supply chain.

(220) Consequently, the Commission concludes that the notified measures, as referenced in recital (197) (a) – (d) are financed from State resources since they are financed from the proceeds of a mandatory levy imposed by the State and

[64] See articles 31 and 40 of directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity.

which are managed and apportioned in accordance with the provisions of the legislation[65].

(221) The Commission also concludes that the reduced CHP surcharge for hydrogen producers (recital (197) letter (d)) constitutes a renouncement of State resources. As the Court has concluded that waiving revenue which would otherwise have been paid to the State constitutes a transfer of State resources[66], the CHP surcharge is financed from State resources.

4.1.3. Effect on trade and impact on competition

(222) In accordance with settled case law[67], for a measure to impact competition and trade it is sufficient that the recipient of the aid competes with other undertakings on markets open to competition.

(223) As regards support to CHP installations (recital (197) letter (a)), the granting of aid to German producers of CHP electricity strengthens their position on the relevant market *vis-à-vis* other electricity producers, including those placed in other countries of the European Economic Area (EEA). On a liberalised electricity market, producers of cogenerated electricity that is injected into the grid compete with other electricity producers. The measure is therefore liable to distort competition between electricity producers. As there is cross-border trade of electricity, the measure also affects trade on electricity markets across the EEA. The support can further have an impact on the heat market given that by triggering or increasing electricity production from CHP installations, the support concomitantly increases production of heat from the CHP installations while the heat market is open to competition and trade between Member States.

(224) As to the aid to CHP installations used for self-consumption, it may distort competition between undertakings within the same sector as not all undertakings are eligible (depending on the size of the installation and whether the undertaking is electro-intensive or not) and is also likely to affect trade between Member States. In particular, sectors like the chemical sector, the paper industry, automobile manufacturing and automotive supply that are likely to benefit from CHP-support are in competition with undertakings located in other Member States. Moreover, CHP self-consumption of CHP can impact the market to the extent that otherwise such energy could be purchased in the market.

(225) As regards aid to district heating/cooling networks (recital (197) letter (b)), it can have an impact in particular on the heat market which is open to competition and trade between Member States. Construction or expansion of district heating/cooling networks enables district heating/cooling companies to connect more consumers to the network and is likely to increase the number of consumers

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65 See Judgment of 28 March 2019, *Germany v Commission (EEG)*, C-405/16 P, EU:C:2019:268, paragraphs 68 and 72; Judgment Judgment of 15 May 2019, *Achema and Others*, C-706/17, EU:C:2019:407, paragraph 57 and Judgment of 20 September 2019, *FVE Holýšov I and Others v Commission*, T-217/17, EU:T:2019:633, paragraph 111.

66 Judgment of the Court of Justice of 16 May 2000, France v Ladbroke Racing Ltd and Commission, C-83/98 P, ECLI:EU:C:2000:248, paragraphs 48 to 51.

67 Judgment of 30 April 1998, T-214/95, *Het Vlaamse Gewest v Commission*, ECLI:EU:T:1998:77.

switching from decentralised heat/cooling generation to district heating/cooling. There is trade between Member States in the production of heat boilers. As the utilities have to use the district heating/cooling networks in combination with CHP installations, investment aid for the network can reinforce their position on the heat and on the electricity market. The measure has therefore also the potential to distort competition between electricity producers. As there is cross-border trade of electricity, the measure also affects trade on electricity markets across the EEA.

(226) As regards aid to storage facilities (recital (197) letter (c)), it can distort competition and affect trade between Member States in a similar way to the support for CHP installations, given that the storage facility will increase the number of operating hours of the CHP installations connected to the storage facility.

4.1.4. Conclusion

(227) For the reasons set out in sections 4.1.1 to 4.1.1.3 above, the Commission concludes that:

(a) the support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations as described in section 2.2;

(b) the support to energy-efficient district heating/cooling networks as described in section 2.5;

(c) the support to heat/cooling storage facilities as described in section 2.4;

(d) the support to the production of CHP electricity in existing (depreciated) highly efficient gas-fired CHP installations in the district heating sector, as described in section 2.3;

(e) the reduced CHP surcharge for hydrogen producers.

constitute State aid within the meaning of Article 107 (1) TFEU.

4.2. Legality

(228) Germany has notified the modification of the aid schemes described in sections 2.2, 2.4 and 2.5 and has subjected them to the approval by the Commission (see recital (149)). The obligation under Article 108(3) TFEU has been fulfilled.

(229) The Commission notes that Germany implemented the changes to the support to existing CHP installations as described in section 2.3 before the Commission's approval in order to remedy identified overcompensation.

4.3. Compatibility

(230) The Commission has assessed the notified aid measures on the basis of Article 107(3)(c) TFEU.

(231) In particular, as the notified scheme relates to the measures of recital (224) (a) – (c) aimed at the support of energy efficiency measures, including cogeneration and district heating and cooling, the Commission has assessed the aid measures on the basis of the EEAG, in particular section 3.4 thereof. On 2 July 2020, the

Commission adopted a communication prolonging the EEAG until 31 December 2021 and amending them[68].

(232) The measure listed in recital (224)(d) has been assessed directly under Article 107(3)(c) TFEU.

(233) 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'*.

4.3.1. Support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations (described in section 2.2)

4.3.1.1. Contribution to the development of an economic activity

A) The economic activity concerned by the measure

(234) Under Article 107(3)(c) TFEU, the measure must contribute to the development of certain economic activities[69].

(235) The notified aid measure supports the development of cogeneration of heat and electricity in high-efficiency installations, which satisfy the definition of high-efficiency cogeneration pursuant to Annex II of the Energy Efficiency Directive (see recital (21)), in line with point 139 of the EEAG. The economic activity supported by the measure is therefore electricity and heat generation.

B) Facilitation of the economic activity and incentive effect

(236) The scheme supports the construction of new CHP installations, which would not otherwise be constructed. It also supports modernisation and retrofitting of existing CHP installations allowing them to operate for a longer time than without the support. In so doing, the measure at issue contributes to the development of the economic activity of electricity production from high-efficient CHP.

(237) Moreover, and in line with point 49 of the EEAG, the Member State must demonstrate that the aid has the effect of incentivising the beneficiaries to change their behaviour.

(238) The calculations provided by Germany (see Table 20 to Table 27) show that the production costs of electricity from high-efficiency CHP (LCOE) are higher than the electricity market price and that this will remain the case in the next coming years of the duration of the scheme as market conditions are projected to remain similar in the next years (see Table 19) showing that increases in electricity prices are compensated by increases in natural gas prices and CO_2 emission certificate prices. The calculations further show that the notified aid improves the rate of

68 See Communication C(2020) 4355 final – In particular, in point (16) of the EEAG, the following sentence has been added: 'These Guidelines shall, however, apply to undertakings which were not in difficulty on 31 December 2019 but became undertakings in difficulty in the period from 1 January 2020 to 30 June 2021.'

69 Judgment of 22 September 2020, *Austria v Commission*, C-594/18 P, EU:C:2020:742, paragraphs 20 and 24.

return of the projects and creates the incentives to undertake or carry on cogeneration of electricity in CHP plants in most of the sectors and situations covered by the notified measure and that, conversely, without support such activity would unlikely be economically viable and therefore would not be carried out.

(239) As explained in recitals (55) and (57), the request submitted to the BAFA to obtain the "*Zulassung*" must contain the name and address of the operator, the description of the installation (installed capacity/size, fuel used, energy efficiency, costs), whether the electricity is injected into a public grid, the date at which the installation entered into operation and more generally all information demonstrating that all eligibility conditions are met, in line with point 51 of the EEAG. Besides, for the situations described in section 2.2.1.2, the Commission notes that the aid is granted under the KWKG automatically when all eligibility conditions are fulfilled. The BAFA has no discretion in delivering the "*Zulassung*". It will verify on the basis of an application form and the needed evidence that all eligibility conditions are needed. If it is the case, it has the obligation to deliver the "*Zulassung*".

(240) In line with point 52 of the EEAG, the use of an application for the aid is not required where the aid is awarded on the basis of a competitive bidding process (see sections 2.2.1.1 and 2.2.2.1).

(241) As regards the point raised by some third parties mentioned in recital (183) concerning the coal-switch bonus, the Commission underlines, like Germany (see recital (186)), that the fact that the law indicates that the new CHP installation must enter into operation "at the earliest after 1 January 2016" is not relevant because of the general transitional provision clause in § 35 (17) KWKG, according to which the new coal switch bonus only applies to CHP installations which have entered into operation after 13 August 2020. Moreover, to receive the new coal switch bonus, the new CHP plant must start operating on a permanent basis no later than 12 months after the end of operation of the old plant. In view of the above, the Commission considers that the support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations has an incentive effect and facilitates the development of electricity production, as required by Article 107(3)(c) TFEU.

4.3.1.2. Compliance with other provisions of EU law

(242) State aid which contravenes provisions or general principles of EU law cannot be declared compatible[70].

(243) If a State aid measure (including its method of financing) entails aspects which are indissolubly linked to the object of the aid and which breach other provisions of Union law, such a breach could affect the assessment of compatibility of that State aid[71].

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70 Judgment of 22 September 2020, *Austria v Commission*, C-594/18 P, EU:C:2020:742, paragraph 44.

71 See recital (25) of the Commission Decision in State aid SA.40029 (2014/N) "Reintroduction of the winding-up scheme, compensation scheme, Model I and Model II – H1 2015", OJ C 136,

(244) Network operators may include the costs of the expenditures required under the KWKG as a surcharge in the calculation of network charges, as a uniform rate per kWh consumed (see recitals (173) and (174) above) and in practice do so.

(245) As the support for CHP electricity is financed by a charge levied on all electricity consumption, the Commission has examined its compliance with Articles 30 and 110 TFEU (see also point 29 of the EEAG).

(246) According to the case-law[72], a charge which is imposed on domestic and imported products according to the same criteria may nevertheless be prohibited by the Treaty if the revenue from such a charge is intended to support activities which specifically benefit the taxed domestic products. If the advantages which those products enjoy wholly offset the burden imposed on them, the effects of that charge are apparent only with regard to imported products and that charge constitutes a charge having equivalent effect to custom duties, contrary to Article 30 TFEU. If, on the other hand, those advantages only partly offset the burden borne by domestic products, the charge in question constitutes discriminatory taxation for the purposes of Article 110 TFEU and will be contrary to that provision as regards the proportion used to offset the burden borne by the domestic products.

(247) When domestic electricity production is supported by aid that is financed through a charge on all electricity consumption (including consumption of imported electricity), then the method of financing – which imposes a burden on imported electricity not benefitting from this financing – risks having a discriminatory effect on imported CHP electricity and thereby violating Article 30 or 110 TFEU[73].

(248) As described under section 2.11 above, the scheme is financed by a surcharge on electricity consumption. In this respect, therefore, the Commission notes that:

(a) the notified aid scheme is financed through a charge imposed on electricity consumed in Germany, irrespective of whether domestically produced or imported;

(b) the surcharge is levied by network operators and it must be calculated on the amount of electricity consumed (and thereby imposed on the product itself).

(249) Where aid for domestic producers is financed through a charge that is levied on imported and domestic products alike, the charge may have the effect of further exacerbating the distortion on the product market caused by the aid as such. For that matter, it is not necessary that the charge exclusively finances the aid, since the additional distortive effect can already be present if a sizable share of the revenue from the charge is used to finance the aid (here the largest part of the

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24.4.2015, p.4. See recital (29) of Commission Decision in State aid SA.42215 (2015/N) "Prolongation of the Greek financial support measures (art. 2 law 3723/2008)", OJ C 277, 21.8.2015, p.11.

72 Judgment of 14 April 2005, joined cases *AEM*, C-128/03 and C-129/03, EU:C:2005:224, paragraphs 44 to 47; Judgment of 17 July 2008, *Essent*, C-206/06, EU:C:2008:413, paragraph 42.

73 Judgment of 25 June 1970, *France v Commission*, Case 47-69, EU:C:1970:60, paragraph 20. See also Case SA.38632 (2014/N) Germany – EEG 2014 – Reform of the Renewable Energy Law.

budget of the scheme is reserved to the support of the production of CHP electricity, while only a small part is used for the other support measures).

(250) In order to alleviate any concern regarding compliance with Articles 30 and 110 TFEU, Germany, as set out in section 2.2.1.1 above, ensures that producers located in other European Member States will be allowed to bid for 5% of the capacity allocated within the tenders, if certain pre-conditions are fulfilled. This corresponds to the percentage also used to allow participation of foreign producers in tenders for the support for renewable electricity.[74]

(251) The participation of producers from other Member States in the support scheme is subject to an agreement with the relevant Member State having the content described under recital (37)(e) above. The Commission considers that this type of technical agreement is necessary for practical reasons in order to determine the allocation of CO_2 emission reductions resulting from the CHP generation and also in order to obtain the agreement of the other Member State as to the conditions under which support can be given to a CHP installation located on its territory. The Commission therefore concludes that opening the scheme in this manner reduces the risk of possible discrimination against producers of CHP electricity in other Member States.[75]

(252) In light of the above, the Commission considers that the notified aid measure does not infringe Article 30 or Article 110 TFEU.

(253) As regards the points raised by some third parties about the conformity of the notified aid scheme with the Renewable Energy Directive (see recital (184)):

(a) Conformity with article 4 (4) of the Renewable Energy Directive: The Commission notes that, according to this article, Member States shall ensure that support for electricity from renewable sources is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner. The fact that CHP installations which are already supported via the EEG scheme (see recital (184)) cannot, on top of the EEG support, receive aid through the notified measure, cannot be considered as a discrimination against RES. The notified measure is indeed open to CHP installations using RES such as biomass and biogas (see recital (22)), so that operators can choose the support they prefer (EEG scheme or CHP scheme, see recital (17)). The exclusion mentioned in recital (184)

74 This percentage has been established as a function of the total capacity of interconnectors connecting Germany to other Member States and EEA countries divided by the total electricity consumption in Germany and multiplied by the yearly new installed renewable capacity (expressed in production volumes). The Commission has considered that this was in line with Articles 30/110 TFEU given that the cumulated capacity of interconnectors in turn determines how much electricity can be imported (see recital 335 of the Commission Decision in State aid SA.38632 (2014/N) "EEG 2014", OJ C 325, 02.10.2015).

75 Other cases in which the Commission approved opening a scheme in this manner are: Commission Decision in State aid SA.38632 (2014/N) "EEG 2014", OJ C 325, 02.10.2015; Commission Decision in State aid SA.45461 (2016/N) "EEG 2017", OJ C 68, 03.03.2017; Commission Decision in State aid SA.57779 (2020/N) "EEG 2021", in publication; Commission Decision in State aid SA.42393 (2016/C) (ex 2015/N) "Reform of support for cogeneration in Germany", OJ C 406, 04.11.2016, Commission Decision in State aid SA.43697 (2015/N) "Polish support scheme for RES and relief for energy-intensive users", OJ C 127, 21.02.2018.

guarantees that no overcompensation occurs through a cumulation of the aid from the EEG scheme with aid from the notified measure.

(b) Conformity with article 6 (1) of the Renewable Energy Directive: The Commission notes that, according to this article, without prejudice to adaptations necessary to comply with Articles 107 and 108 TFEU, Member States shall ensure that the level of, and the conditions attached to, the support granted to renewable energy projects are not revised in a way that negatively affects the rights conferred thereunder and undermines the economic viability of projects that already benefit from support. Contrary to what the comment mentioned in recital (184) implies, this article does not mean that the Member States have to avoid implementing any energy policy which might negatively affect the profitability of RES installations already financially supported in the past. The article only refers to the "level of, and the conditions attached to, the support granted to renewable energy projects". The notified scheme does not alter the EEG scheme, and the changes implemented with the reform only concern CHP installations which enter into operation at the earliest after 31 December 2019, i.e. not to CHP installations already entered into operation and benefitting from the support as approved in the 2016 decision.

(254) In light of the above, the Commission considers that the notified aid measure does not infringe article 4 (4) or article 6 (1) of the Renewable Energy Directive.

4.3.1.3. The aid is designed in order to limit its effects on competition and trade

A) Need for State intervention

(255) In the case of cogeneration, the Commission presumes that energy efficiency measures target negative externalities by creating individual incentives to attain environmental targets for energy efficiency and for the reduction of greenhouse gas emissions (see points 35 and 142 of the EEAG). The information provided by Germany shows that the market alone and carbon pricing via the EU-ETS system and the national carbon price would not by themselves trigger investments in CHP installations. A residual market failure exists, as shown in particular by the extra costs borne by high-efficiency CHP plants (see Table 20 to Table 27 above showing that LCOE are higher than market price). This market failure can be addressed through aid to promote energy efficiency.

(256) As regards the point raised by some third parties mentioned in recital (182), the Commission considers that the new coal switch bonus is necessary to incentivise the replacement of emitting coal-fired CHP installations by new, less polluting CHP plants. Indeed, as explained in recitals (81) to (84), even with increasing CO_2 prices, operators of coal-fired CHP installations would face foregone profits and would therefore not replace their polluting plant before the end of their lifetime, unless they are compensated for such replacement.

(257) The Commission therefore considers that the measure is needed.

B) Appropriateness of the aid

(258) In line with point 145 of the EEAG, State aid may be considered an appropriate instrument to finance energy efficiency measures, independently of the form in

which it is granted. Premiums on top of market price and tariffs, in case of small installations (equal to or below 100 kW) choosing such form of support (see recital (24)), are appropriate aid instruments to compensate CHP plants for the higher production costs of electricity from highly efficient cogeneration, as they target the additional cost element that is not covered by the market price.

(259) As a result, the Commission considers that the aid measure is appropriate.

C) Proportionality of the aid (operating aid for high energy efficient CHP)

(260) The notified measure consists of operating aid for the production of electricity in highly energy-efficient CHP installations, thus point 151 of the EEAG is applicable for the assessment of proportionality.

(261) The CHP plants benefiting from the measure fall into both categories defined in point 151 (a) and (b) of the EEAG: they either partly or entirely sell electricity to the public and their output partly serves for industrial use.

(262) For the assessment of proportionality, point 151 of the EEAG refers to the conditions applying to operating aid for electricity from renewable energy sources under section 3.3.2.1 of the EEAG.

(263) The aid is paid out as a premium on top of the market price (see recital (23)) and the operator of the CHP installation has to sell the electricity on the market (see recital (24)). Therefore, the aid scheme complies with point 124 (a) of the EEAG.

(264) The operator is also subject to normal balancing responsibilities (see recital (25) above), in line with point 124 (b) of the EEAG.

(265) Finally, the scheme does not create any incentives to produce at time of negative prices in line with point 124 (c) of the EEAG because:

(a) The aid is paid out as a fixed premium and for a limited amount of full load hours (see recitals (26) and (27)). This feature increases the incentives to sell the electricity at times of higher demand, as this will maximise the revenues and conversely reduces incentives to produce at times of negative prices.

(b) Germany suspends the support at times of negative prices (see recital (29) above).

(266) The operator can also self-consume the electricity produced in line with point 151 (b) of the EEAG. The aid is paid in the form of a premium obtained in addition to the benefits resulting from the fact that the operators of the CHP installations do not need to pay the market price for the electricity they are self-consuming.

(267) As set out in recital (24) above, CHP installations up to 100 kW have the possibility to request the network operators to purchase the electricity from them at an agreed price or at the average market price. This is in line with point 125 of the EEAG, which provides that smaller installations are exempted from the market integration obligations listed under point 124 of the EEAG.

(268) As described in section 2.2.1.1 above, Germany grants the aid for the production of electricity in highly efficient new or modernised CHP installations with a

cogeneration electricity capacity between 500 kW and 50 MW on the basis of a tender, which qualifies as a competitive bidding process under point (19)(43) of the EEAG for the following reasons:

(a) This tender is a non-discriminatory bidding process where the aid is granted on the basis of the initial bid of the bidder (see recital (49)).

(b) The tender is limited in volume expressed in MW (see recital (49)).

(c) To ensure the competitiveness of the tenders in the future, Germany has lowered the participation threshold from 1 MW to 500 kW which will increase the number of bidders and capacity bid (see recital (53)) and has developed a dedicated mechanism to reduce the volume tendered if two auctions in a row have been undersubscribed (see recital (54)).

(d) As explained in recital (50), a bid cap of 7 € cent/kWh applies in the tender to limit the risk of any overcompensation and the exercise of market power. The Commission notes that its level has been carefully studied and that Germany has committed to review it if necessary, as described in recital (141).

(269) As described in section 2.2.2.1 above, Germany grants the aid for the production of electricity from iKWK systems for CHP with a capacity between 1 MW and 10 MW on the basis of a tender, which qualifies as a competitive bidding process under point (19)(43) of the EEAG for the following reasons:

(a) This tender is a non-discriminatory bidding process where the aid is granted on the basis of the initial bid of the bidder (see recital (71)).

(b) The tender is limited in volume expressed in MW (see recital (71)).

(c) The last three tenders have been largely oversubscribed (see Table 6 and Table 7), while Germany has also committed to study the possibility to extend further the iKWK tenders (see recital (75)), which could contribute to a further increase in the competitiveness of the tenders.

(d) As explained in recital (73), a bid cap of 12 € cent/kWh applies in the tender to limit the risk of any overcompensation and the exercise of market power. The Commission notes that its level has been carefully studied and that Germany has committed to review it if necessary, as described in recital (141).

(270) As explained in recital (76), the innovative RES heat bonus can only be granted in addition to the general CHP support described in section 2.2.1. Consequently, a bidder in the general CHP tender wanting to implement an iKWK system can deduct the innovative RES bonus from the price of its bid, since he knows in advance that it can benefit from it, if the conditions set out in section 2.2.2.2 are met. Therefore, no overcompensation nor discrimination can occur in a competitive general CHP tender, as long as the innovative RES heat bonus corresponds to the actual additional costs of an iKWK system, which is indeed the case in the notified measure: Table 31 to Table 33 show that the levels of the innovative RES heat bonus (see Table 8) are in line with the actual costs of typical investments related to iKWK systems.

(271) As explained in recital (79), the coal switch bonus can only be granted in addition to the general CHP support described in section 2.2.1 or the support received through the iKWK tenders described in section 2.2.2.1. Consequently, a bidder in

the general CHP tender or in the iKWK tender wanting to replace an existing coal-fired CHP installation can deduct the coal switch bonus from the price of its bid, since he knows in advance that it can benefit from it, if the conditions set out in section 2.2.3 are met. Therefore, no overcompensation nor discrimination can occur in a competitive general CHP tender or an iKWK tender, as long as the coal switch bonus corresponds to the actual foregone profits faced by an operator when replacing its coal-fired CHP, which is indeed the case in the notified measure: the explanations provided in recitals (81) to (84) show that the levels of coal switch bonus (see Table 9) are equal to or lower than the foregone profits faced by operators of coal-fired CHP installations. Moreover, as regards the points raised by some third parties mentioned in recital (180), the Commission notes that, to calculate the foregone profits, Germany used a discount rate of 6% and not 30% (see recital (185)), which is coherent with rates used for *Stadtwerke*. Besides, the fact that Germany finally decided to make the level of the coal switch bonus dependant on the age of the coal-fired CHP is better suited to avoid overcompensation than a lump-sum independent of the age of the plant and the moment of replacement, as initially envisaged by Germany. Indeed, as shown in Figure 3, foregone profits depend on the age of the coal-fired CHP plant. For example, a coal switch bonus of 180 EUR/kW would have led to overcompensation for operators of coal-fired CHP entered into operation after 1980. Concerning the point raised by some third parties as mentioned in recital (181), the Commission notes, on the contrary, that the rules are clear: as explained in recital (85), no cumulation is possible between the coal switch bonus and the aid granted through the tender mechanism or the negotiated procedure to phase-out hard coal and lignite installations.

(272) When the support is granted to beneficiaries selected in a tender and is cumulated with investment aid, Germany has committed to deducting the investment aid previously received from the operating aid in line with point 151, read in conjunction with point 129 of the EEAG (see recital (30)).

(273) CHP installations with a capacity of not more than 500 kW (see recital (34)(a)) in case of section 2.2.1.1 will obtain aid without having to be selected in a competitive bidding process. This is in line with point 151 read in conjunction with point 127 of the EEAG.

(274) As described under recital (34)(b) above, Germany will grant the general CHP support to installations with an installed capacity above 50 MWel without tender. As described in recital (39), according to BAFA's 2019 annual report (as at 31.07.2020), only 2 CHP installations over 50 MW started to operate on a permanent basis in 2017, none in 2018 and only 2 installations in 2019. Besides, the corresponding capacity also varied widely (in 2017: 182 MW in total; in 2018: 0 MW; in 2019: 295 MW), which would make it very difficult to determine a volume of tenders ex ante. Given their size (see recital (39)) compared to the size of the tender (see recital (49)), the economies of scale and LCOE of those installations compared to smaller installations and the knowledge of the market by the utilities carrying out those projects (see recitals (40) to (43) above), the Commission concludes that it is likely that owners of those large projects would be able to strategically bid in the tenders with the result that they would be largely overcompensated. Their participation in the tenders could also discourage participation of smaller projects and make the tenders uncompetitive, as also illustrated by the scenarios described under recitals (40) to (43) and (46) above.

The Commission further notes that Germany has examined alternative tender designs which, however, do not solve the issue (see recitals (45) to (46) above).

(275) Based on those elements, the Commission concludes that including installations of more than 50 MWel in the general CHP tenders may render the tenders uncompetitive and lead to higher support levels. Therefore, the exclusion of those larger projects from the tenders is appropriate to prevent strategic bidding. The aid can therefore be granted to those installations without their participation in a competitive bidding process (as per point 126, third paragraph, (b), of the EEAG).

(276) The Commission further notes that Germany committed to complying with the obligation of individual notification for detailed assessment, in line with point 20(d) of the EEAG, when the aid is to be granted to installations with installed capacity of more than 300 MW (see recital (59)).

(277) Retrofitted installations are also exempt from the tender requirement (see recital (34)(c) above). Their production costs being lower than production costs of new or modernised CHP installations, those installations would be able to obtain windfall profits if they were to participate in the same tenders as modernised and new installations. A separate tender cannot be envisaged, as the number of retrofitted installations would be too small to ensure a competitive tender (see recital (48) above). The aid can therefore be granted to those installations without their participation in a competitive bidding process (as per point 126, third paragraph, (a) and (b), of the EEAG).

(278) As described in recital (71), installations with a capacity of not more than 1 MW will be excluded from the iKWK tenders and thus be granted the innovative RES heat bonus support without having to be selected in a competitive bidding process. This is in line with point 151 read in conjunction with point 127 of the EEAG. As regards the similar exclusion of CHP installations with a capacity above 10 MW (see recital (71)), Germany has provided elements showing that CHP installations between 10 MW and 50 MW are limited, and even more is the possibility for them to qualify as iKWK system since the inclusion of RES heat becomes more difficult as the size of installations increases (see recital (75)). Moreover, Germany has committed to study the possibility to extend further the iKWK tenders (see recital (75)) based on the experience gained with the implementation of the innovative RES heat bonus. On this basis, the Commission considers that innovative RES heat bonus can start being granted to CHP installations above 10 MW without their participation in a competitive bidding process (as per point 126, third paragraph, (a), of the EEAG).

(279) Point 128 of the EEAG stipulates that, in the absence of a competitive bidding process, the proportionality of the aid and distortion of competition have to be assessed under points 124, 125 and 131 of the EEAG. Compatibility with points 124 and 125 of the EEAG has already been examined above. The Commission has thus examined the compatibility of the aid under sections 2.2.1.2, 2.2.2.2 and 2.2.3 with point 131 of the EEAG.

(280) Point 131 (a) and (b) of the EEAG provides that the aid per unit of energy shall not exceed the difference between the total LCOE from the particular technology in question and the market price of the form of energy concerned. The total

LCOE may include the plant's normal return on capital but any investment aid should be deducted from the total investment amount in calculating the costs.

(281) The Commission has verified that the support does not exceed the difference between the LCOE and the market price in those cases, where support is given.

(282) First, the Commission observes that when it calculated the LCOE used to determine the level of the premium (see section 2.6 above), Germany correctly deducted from the production costs revenues generated by heat production (either in the form of price obtained for the heat or in the form of savings made due to the fact that the heat does not need to be purchased on the market or produced in a gas boiler) and other advantages (as for instance reduced energy tax for highly efficient CHP). The calculations take also into account the reduced EEG surcharge paid by autogenerators. Furthermore, as explained in recital (145), Germany has committed to take into account revenues from guarantees of origin pursuant to article 14 (10) of the Energy Efficiency Directive as soon as they are exchanged at a price.

(283) Second, concerning the market price used to determine the level of the premium, Germany correctly used the base-load market price as a reference given that CHP installations produce base-load electricity and in case of self-consumption of the electricity, it correctly used the market price that this category of consumer would have had to pay for the electricity concerned if he had to purchase it (see Table 18 above).

(284) Third, for modernised and retrofitted CHP installations, the support is set in proportion to the importance of the investment costs compared to a new installation. Only when the investment costs reach 50% of the costs of a new installation is the support level the same. This is justified by the fact that when the investment costs reach 50% of investment costs of a new installation, the difference in investment costs is not sufficient anymore to outbalance the higher operating costs of modernised or retrofitted CHP installations (see also recital (67) above).

(285) Fourth, as discount rate for the calculation of levelised cost, Germany has used 8% in the district heating sector, 10% for households, 20% in the service industry and 30% in the industry.

(286) The information provided by Germany and summed up under recital (130) above confirms that 8% corresponds to the normal rate of return of the district heating sector. The discount rate used for households reflects the higher risk resulting from the form of the aid (fixed premium instead of floating premium or feed-in tariff) and is in line with the rates of return that the Commission has considered reasonable in other cases[76]. In addition, the support provided under the KWKG is

[76] See for instance Commission Decision in State aid N354/2009 "Support for production of electricity from renewable energy sources and in co-generation installations", OJ C 285, 26.11.2009: the rate of return used was 12%, the aid was granted as feed-in tariff or floating premium; Commission Decision in State aid SA.35486 (N/2013) "Aid for electricity generation in industrial combined heat and power plants", OJ C 277, 21.08.2015: the rate of return used was 10% and the aid was in the form of a premium adapted on the basis of electricity price evolution.

not sufficient to lead to a project return of that level (see Table 20) showing a negative project return even with the support).

(287) The discount rates used for the service sector and the industry are higher than what has been considered as reasonable in other cases[77]. However, the evidence submitted by Germany in 2016 confirmed that in the industry in Germany, CHP projects with a short payback period of 2 to 3 years (corresponding to a 50% to 33% rate of return) are realised, while projects with a payback period above 4 years (25% rate of return) tend to be abandoned (see studies presented under recitals (134) to (137) above). Those rather short payback periods in those sectors can be explained by two factors: first, those sectors are not energy companies and choosing a CHP installation to cover their energy needs (instead of using a heat boiler and purchasing electricity from the grid) will have an impact on their core production process and costs. Investors in the service sector and industry will thus be more risk averse than energy utilities when they make the decision to invest into a CHP installation; they will require a shorter payback period. Second, the form of the subsidy (fixed premium) involves higher risks for the investor compared to floating premiums that are generally used for instance in renewable support schemes or to support CHP projects in other Member States[78]. This in itself increases the rate of return that investors will want to obtain in order to make the investment decision.

(288) The Commission further notes that for several categories of projects, the support will actually not yield excessive rates of return. In particular in the electro-intensive industry, rates of return obtained with the support are much lower than 30% (see Table 23). The support will thus yield projects for which the project owner has accepted a longer payback period (and thus a lower rate of return).

(289) Finally, the Commission notes that Germany has committed to review these rates of return in the course of 2021 and publish an independent study on it before the end of 2022, based on factual and empirical evidence (cf. recital (399)). This should help Germany to determine whether the discount rates used so far are still appropriate and do not lead to overcompensation. If these rates of return turn out to be too high and need to be updated, Germany has committed to adapt the levels of the general CHP support described in sections 2.2.1.2. and section 2.2.2.2. (see recital (141)).

(290) Based on those elements, the Commission considers that the rate of return of supported projects can be considered reasonable. This conclusion is valid also for projects under contracting as the rate of return of the project must be sufficient to remunerate both the contractor and the consumer (see recital (139) above).

(291) The calculations provided by Germany (see Table 20 to Table 28) which are based on the methodology assessed under recitals (279) to (287) show that the production costs of electricity from high-efficiency CHP (LCOE) are higher than the electricity market price and that the CHP-premium paid does not exceed the

[77] See the examples referred to under Footnote 75; see also Commission Decision in State aid SA.43719 "CHP support scheme", OJ C 341, 16.09.2016: the rate of return was between 7 and 8% and the aid had the form of feed-in tariffs or floating premiums.

[78] See cases referred to in footnotes 75 and 76.

difference between the LCOE and the market price of electricity. This is also the case in situations where the beneficiaries obtain the innovative RES-heat bonus (see Table 32 and Table 33) and when in addition to the general CHP support and RES heat bonus the beneficiaries receive also the coal switch bonus (see Table 34). Hence, the Commission concludes that, in line with point 151, read in conjunction with points 128 and 131 (a) and (b) of the EEAG, the aid is limited to the difference between the LCOE and the market price, including a reasonable rate of return on capital.

(292) The Commission also notes that the aid can be cumulated with investment aid, but in that case the investment aid and the operating aid together may not exceed the difference between the LCOE of the CHP installation and the market price of the energy produced, in line with point 151, read in conjunction with points 128 and 131(b) of the EEAG.

(293) The aid is limited to 30 000 hours or 60 000 for micro-cogeneration units (see recital (63)). As results from the elements set out in recital (28), aid granted for this amount of full-load hours does not exceed the normal depreciation period of CHP installations. Therefore, the notified scheme meets the criteria set out in points 131 (b), 2nd sentence, and 131 (d) of the EEAG.

(294) Costs are also updated regularly, at least once a year (see recital (143) above). The notified scheme therefore meets the criterion set out in point of the 131 (c) of the EEAG.

(295) Finally, the Commission notes that the scheme is limited to December 2026 and thus has a duration lower than the maximum allowed by the EEAG.

(296) Consequently, the Commission concludes that the support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations is proportionate.

4.3.1.4. Distortion of competition and balancing test

A) Positive effects

(297) The Commission notes that the scheme can be expected to have a range of positive effects because the eligible activities contribute directly to electricity and heat generation, and indirectly to environmental protection. Indeed, the scheme has positive effects in terms of promotion of energy efficiency and protection of the environment. In this regard, the Commission notes that promotion of energy efficiency and energy saving is one of the aims of the Union’s policy on energy pursuant to Article 194 TFEU. Furthermore, high-efficiency cogeneration as promoted under this aid scheme has been recognised by the Energy Efficiency Directive as having significant potential for saving primary energy and thus for energy efficiency. In addition, as described in recital (17), cogeneration in Germany participates in the reduction of CO2 emissions.

(298) Furthermore, the Commission notes that the notified scheme will not create incentives to circumvent the waste hierarchy principle as established under the

Waste Framework Directive.[79] First, Germany has shown that gas-fired CHP installations have lower LCOE than waste-burning CHP installations (see recital (22)). As the support levels are determined based on the costs of gas-fired CHP installations, the support measure will not create any incentive to burn waste instead of recycling it. Finally, Germany has committed that it will not circumvent the waste hierarchy with the support measure (see recital (32) above), in line with point 140 of the EEAG.

(299) The Commission therefore concludes that the notified aid scheme will not only contribute to the development of the economic activity of electricity and heat generation, but moreover it will do so in a manner that creates incentives for promotion of energy efficiency and energy saving and also contributes to a reduction of CO2 emissions, and therefore it has also positive environmental effects.

B) Negative effects

(300) Support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations can distort competition and trade in the electricity market (see recital (219)) and also between undertakings receiving the support and competitors in the same sectors outside the electricity sector (see recital (221)).

(301) However, in line with point 97 of the EEAG, the aid is well targeted to the market failure it aims to address (as explained in recital (252)), so that the risk that the aid will unduly distort competition is limited.

(302) In line with point 98 of the EEAG, since the aid is proportionate and limited to the extra (investment) costs (see section 4.3.1.3), the negative impact of the aid on competition and trade is softened.

(303) The Commission also notes that an important part of the aid is attributed through tenders, which are non-discriminatory, transparent and open, without unnecessarily excluding companies that may compete with projects to address the same environmental or energy objective (see recitals (265) and (266)). These tenders lead to the selection of beneficiaries that can address the environmental and energy objectives using the least amount of aid and in the most cost-effective way. The exemptions to tendering are well justified (see recitals (271) to (275)), while Germany also committed to study the possibility to extend tendering further (see recital (75)) in the future. Therefore, in line with point 99 of the EEAG, the Commission considers that the distortions of competition and trade are kept to a minimum.

C) Conclusions on distortion of competition and balancing test

(304) In light of the above, the Commission concludes that the scheme has significant positive effects in terms of facilitating an economic activity and in a manner that contributes to environmental protection, while not leading to undue distortions of

[79] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, OJ L 312, 22.11.2008, p. 3.

competition and trade. It follows that the positive effects of the aid outweigh its negative effects on competition and trade.

4.3.1.5. Conclusion with regard to the compatibility of the support to the production of CHP electricity in new, modernised and retrofitted highly efficient CHP installations (described in section 2.2)

(305) In light of the above, the Commission concludes that the aid to producers of CHP electricity in new, modernised and retrofitted highly efficient CHP installations 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 and on the relevant provisions of EEAG.

4.3.2. Support to district heating/cooling networks (as described in section 2.5)

4.3.2.1. Contribution to the development of an economic activity

A) The economic activity concerned by the measure

(306) Under Article 107(3)(c) TFEU, the measure must contribute to the development of certain economic activities[80].

(307) The notified aid measure contributes to the development of district heating/cooling infrastructure. The measure supports the construction and expansion of energy-efficient district heating/cooling networks for CHP installations, which would not otherwise be constructed/expanded. In so doing, the measure at issue contributes to the development of the economic activity of energy-efficient district heating/cooling.

B) Facilitation of an economic activity and incentive effect

(308) As set out in recital (116) above, Germany has demonstrated that without support district heating or cooling networks could not be deployed as they typically have a funding gap of around 40% of investment costs. In addition, in order to obtain the confirmation that the project is eligible for aid, the project owner has to submit the information requested under point 51 of the EEAG.

(309) Moreover, Germany has committed to carrying out a credibility check of the counterfactual scenario, as requested under point 52 of the EEAG (see recital (110) above).

(310) Based on those elements, the Commission concludes that the aid measure has an incentive effect and facilitates the development of an economic activity as required by Article 107(3)(c) TFEU.

[80] Judgment of 22 September 2020, *Austria v Commission*, C-594/18 P, EU:C:2020:742, paragraphs 20 and 24.

4.3.2.2. The aid is designed in order to limit its effects on competition and trade

A) The economic activity concerned by the measure

(311) The investment aid for energy-efficient district heating aims at covering positive externalities linked to the use of efficient district heating network but which are not priced in. Energy-efficient district heating/cooling is more energy-efficient than the separate use of individual boilers. These positive externalities are however not priced in. Germany has explained that the use of the district heating network is not remunerated separately. The district heating network generally belongs to the owner of the main heat generating facility feeding heat into the district heating network (generally a CHP installation). The network costs have to be recouped with the heat revenues (and as the case may be with electricity revenues linked to the coproduced electricity), which, however, are not sufficient to cover infrastructure costs. On the heat market, owners of district heating facilities are in competition with individual boiler solutions, but also with other heat sources injecting heat into the district heating network, including waste heat and heat from waste incineration. An aid measure is therefore necessary to trigger the investment.

(312) The Commission therefore considers that the measure is needed.

B) The economic activity concerned by the measure

(313) According to point 145 of the EEAG, State aid may be considered an appropriate instrument to finance energy efficiency measures, independent of the form in which it is granted.

(314) The Commission therefore concludes that the measure is an appropriate instrument to incentivise investments in the energy efficient district heating/cooling networks

C) Proportionality of the aid (investment aid for energy-efficiency measures)

(315) Point 148 of the EEAG, read in conjunction with point 73, defines the eligible costs as the extra investment costs in tangible and/or intangible assets which are directly linked to the project. Where the costs can be identified in the total investment costs as a separate investment, the costs of the separate investment constitute the eligible costs. In the case of district heating infrastructure, the entire investment constitutes the eligible costs given that the entire infrastructure is needed to achieve the energy efficiency and also the entire investment concerned would not have been made without the aid (see also Article 46(5) of the GBER[81]). However, the eligible costs are limited to the funding gap (as per point 76 of the EEAG). The aid intensity can reach 100% of eligible costs (see Annex 1 to the EEAG, for district heating infrastructure).

[81] Commission Regulation (EU) No 615/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty (OJ L 187, 26.6.2014, p. 1).

(316) Point 19(32) of the EEAG defines the funding gap as the difference between the positive and negative cash flows over the lifetime of the investment, discounted to their current value (typically using the cost of capital).

(317) Germany has submitted a detailed funding gap calculation that shows that the funding gap of district heating/cooling networks projects corresponded to around 40% of the investment costs, and that aid limited to those rates will thus not exceed the funding gap (see Table 15).

(318) In addition, as set out in recital (117) above, in cases where aid under the KWKG would be cumulated with aid from the Länder and local authorities or other federal aid schemes, Germany committed to limiting the aid to the funding gap within the meaning of point 19(32) of the EEAG.

(319) Based on the above, the Commission considers that the aid granted under the notified measure is proportionate.

4.3.2.3. Distortion of competition and balancing test

A) Positive effects

(320) The Commission notes that the scheme can be expected to have a range of positive effects because the eligible activities contribute directly to the development of the economic activity of energy-efficient district heating/cooling, and indirectly to environmental protection. Indeed, the aid to district heating/cooling networks has positive effects in terms of promotion of energy efficiency and protection of the environment. In this regard, the Commission notes that promotion of energy efficiency and energy saving is one of the aims of the Union's policy on energy pursuant to Article 194 TFEU.

(321) The EU has set binding targets of reducing our energy consumption through improvements in energy efficiency by 2030 by at least 32.5%, relative to a 'business as usual' scenario. In particular, the Union adopted the Energy Efficiency Directive, which establishes a common framework to promote energy efficiency within the Union. Energy-efficient district heating/cooling networks can make an important contribution to energy efficiency when they are used to transport waste heat, renewable heat or cogenerated heat. Efficient district heating and cooling within the meaning of Article 2(41) and 2(42) of the Energy Efficiency Directive is defined as a district heating or cooling system using at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat. As set out in recital (108) above, investment aid under the KWKG is granted to district heating networks only if they either contain at least a 75 % share of CHP or at least a 75 % share of CHP heat, RES heat and waste heat combined. This complies with the definition of the energy-efficient district heating under point 19(14) of the EEAG.

B) Negative effects

(322) As described under recital (222) above, the main impact on competition of the investment aid for district heating/cooling networks is that it enables district heating/cooling companies to connect more heat consumers to the district heating network. In addition, larger district heating/cooling networks and larger consumer basis can help increasing the number of operating hours of the CHP installations feeding the heat into the network and thus also help increasing CHP electricity

production. The investment aid can thus have the effect of reducing the number of consumers using individual heat boilers and of displacing more polluting electricity. This impact, however, corresponds exactly to the environmental purpose of the aid.

(323) As the support is limited to the funding gap and available only to highly efficient networks, the Commission concludes that the negative effects of the aid on competition are sufficiently limited.

C) Conclusion on distortion of competition and balancing test

(324) In light of the above, the Commission concludes that the aid has significant positive effects in terms of facilitating an economic activity and in a manner that is also beneficial in terms of environmental protection, while not leading to undue distortions of competition and trade. It follows that the positive effects of the aid outweigh its negative effects on competition and trade.

4.3.2.4. Conclusion with regard to the compatibility of the support to district heating/cooling networks (as described in section 2.5)

(325) In light of the above, the Commission concludes that the aid to district heating/cooling networks 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 and on the relevant provisions of EEAG.

4.3.3. Support to heat and cooling storage facilities (as described in section 2.4)

4.3.3.1. Contribution to the development of an economic activity

A) The economic activity concerned by the measure

(326) Under Article 107(3)(c) TFEU, the measure must contribute to the development of certain economic activities[82].

(327) The measure supports the building of new or retrofitting of heat and cooling storage facilities. Such facilities are key elements to increase the energy efficiency and integration of CHP installations into the electricity market as they allow them to increase their flexibility and to run for an increased number of operating hours. In so doing, the measure at issue contributes to the development of the economic activity of storage of heat/cool.

B) Facilitation of an economic activity and incentive effect

(328) The information provided by Germany described under recitals (97) and (103) above shows that without support storage facilities are not deployed as the investment costs cannot be recouped through higher revenues from a more flexible use of the CHP installation. In addition, in order to obtain the confirmation that the project is eligible for aid, the project owner has to submit

[82] Judgment of 22 September 2020, *Austria v Commission*, C-594/18 P, EU:C:2020:742, paragraphs 20 and 24.

the information requested under point 51 of the EEAG. Finally, Germany has committed to carrying out a credibility check of the counterfactual scenario as requested under point 52 of the EEAG (see recital (105) above).

(329) In view of the above, the Commission considers that the aid to heat and cooling storage facilities has an incentive effect and facilitates the development of certain economic activities, as required by Article 107(3)(c) TFEU.

4.3.3.2. The aid is designed in order to limit its effects on competition and trade

A) Need for State intervention

(330) The investment aid for heat/cooling storage facilities aims at covering positive externalities linked to the use of storage facilities but which are not priced in. Storage facilities increase the energy efficiency of CHP installations and district heating/cooling systems but are not remunerated by separate fees. In addition, while they enable a more flexible use of CHP installations, the additional flexibility improves the economics of those installations only to a very limited extent, yielding a small surplus not sufficient to pay back the investment. Aid is therefore needed to achieve the objective pursued.

B) Appropriateness of aid

(331) Germany has explained that investment subsidies were the most suitable to trigger investment in storage facilities as they do not cover the entire investment costs and therefore incentivise the operators to maximise the use of their storage facilities by running the connected CHP plants in line with the demand for electricity. This yields the best results in terms of energy efficiency and integration of the CHP plants into the electricity market. In addition, the Commission considers that State aid can be considered an appropriate instrument to finance an energy-efficiency measure, independently of the form in which it is granted (as per point 145 of the EEAG).

C) Proportionality of the aid (investment aid for energy-efficiency measures)

(332) Point 148 of the EEAG, read in conjunction with point 73, defines the eligible costs as the extra investment costs in tangible and/or intangible assets which are directly linked to the project. Where the costs can be identified in the total investment costs as a separate investment, the costs of the separate investment constitute the eligible costs.

(333) In the case of heat/cooling storage facilities used in connection with CHP installations, the entire investment constitutes the eligible costs given that the entire infrastructure is needed to achieve the energy efficiency and also the entire investment concerned would not have been made without the aid. As the storage facility has to be linked to a CHP installation, the Commission has examined the proportionality of the investment aid in line with aid intensities for CHP installations. When the concerned CHP installations are used in the district heating sector, the maximum aid intensities for district heating production plants should be used.

(334) Under the KWKG, aid for storage facilities is limited to 30% of the eligible investment costs. In addition, eligible costs exclude administrative fees, internal

costs for the construction and planning, imputed costs ("*kalkulatorische Kosten*"), costs related to insurances, financing and land acquisition. The aid amount under the KWKG is thus below the maximum aid intensities allowed under the Annex 1 of the EEAG and also the eligible costs are stricter than under the EEAG (see point 19(23), which under certain circumstances also considers investments in land as eligible costs when strictly necessary to meet environmental objectives).

(335) For small storage facilities the aid is limited to EUR 12 500 (see recital (101) above), which is well below the *de minimis* ceiling.

(336) Aid for storage under the KWKG can be cumulated with aid from the Länder, local authorities or other federal support schemes. As set out in recital (106) above, Germany has committed to limiting the aid to the aid intensities set out in Annex 1 to the EEAG for CHP installations.

(337) Based on those elements, the Commission concludes that the aid measure is proportionate.

4.3.3.3. Distortion of competition and balancing test

A) Positive effects

(338) The Commission notes that the scheme can be expected to have a range of positive effects because the eligible activities contribute directly to the development of the economic activity of building of new or retrofitting of heat and cooling storage facilities, and indirectly to environmental protection. Indeed, for the reasons set out in recitals (97) to (100) above, heat storage can make an important contribution to energy efficiency when used as required by the notified support scheme to store cogenerated heat, waste heat and renewable heat. In this regard, the Commission notes that promotion of energy efficiency and energy saving is one of the aims of the Union's policy on energy pursuant to Article 194 TFEU.

(339) The storage facility enables CHP installations to produce at times of higher electricity demand, when they will displace electricity produced from more polluting electricity plants in Germany. This will significantly reduce the CO2 emission resulting from electricity production, which is exactly the environmental purpose pursued by the measure.

B) Negative effects

(340) As described under recital (223) above, storage facilities can impact competition in the sense that they increase the flexibility of CHP installations and help increasing their number of operating hours.

(341) As the support is limited to the aid intensities set out in Annex 1 to the EEAG, the negative effects of the aid on competition and trade are limited (see point 95 of the EEAG).

C) Conclusions on distortion of competition and balancing test

(342) In light of the above, the Commission concludes that the measure has significant positive effects in terms of facilitating an economic activity and of environmental protection while not leading to undue distortions of competition and trade. It

follows that the positive effects of the aid outweigh its negative effects on competition and trade.

4.3.3.4. Conclusion with regard to the compatibility of the support to heat and cooling storage facilities (as described in section 2.4)

(343) In light of the above, the Commission concludes that the aid to heat and cooling storage facilities 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 and on the relevant provisions of EEAG.

4.3.4. Support to the production of CHP electricity in existing (depreciated) highly efficient gas-fired CHP installations in the district heating sector, as described in section 2.3

(344) The original measure described in section 2.3.1 has been assessed directly under Article 107(3)(c) TFEU in the 2016 decision. The alteration described in section 2.3.2 mainly impacts the proportionality of the aid.

(345) As set out in the 2016 decision, the Commission considers it appropriate to examine the aid measure planned by Germany for existing gas-fired CHP installations in the district heating sector directly under the Treaty. In this respect the Commission notes that the EEAG provide for compatibility criteria for aid to existing biomass plants after depreciation. The criteria set out in Section 3.3.2.3 of the EEAG aim in particular at ensuring the proportionality of the aid. The Commission finds it appropriate to use those criteria as guidance for the assessment of the proportionality of the notified aid to existing (depreciated) gas-fired highly efficient CHP installations.

(346) The Commission may declare an aid measure compatible directly under Article 107(3)(c) TFEU if the measure facilitates the development of an economic activity and does not adversely affect trading conditions to an extent contrary to the common interest.

4.3.4.1. Contribution to the development of an economic activity

A) The economic activity concerned by the measure

(347) Under Article 107(3)(c) TFEU, the measure must contribute to the development of certain economic activities[83].

(348) The German authorities have explained that, due to the rise in fuel prices and taxes, there was a risk that the CHP plants would go out of operation or significantly reduce their operating hours, although technically they could still produce or cogenerate during a higher number of hours. In so doing, the measure at issue contributes to the development of the economic activity of electricity production from high-efficient CHP.

[83] Judgment of 22 September 2020, *Austria v Commission*, C-594/18 P, EU:C:2020:742, paragraphs 20 and 24.

B) Facilitation of an economic activity and incentive effect

(349) State aid has an incentive effect if it incentivises the beneficiary to change its behaviour towards the development of a certain economic activity pursued by the aid and if the change in behaviour would not occur without the aid[84].

(350) The calculations provided by Germany (see Table 29) show that the creation of more representative groups of CHP installations and adjustment of the CHP support for 2019 has led to a situation, where production costs of electricity from gas-fired high-efficiency CHP installations in the district heating sector were again higher than the electricity market price even after depreciation of the investment, for the average of 2018 and 2019. This means that the remuneration rates were reduced in such a way, that also the observed overcompensation in 2018 was recouped. That was likely to remain so for plants between 2 and 300 MW until end 2019, as shown by the projected LCOE of Table 29. The calculations further show that the notified reformed aid created the incentives to maintain the installations in operation or at least significantly increase the number of operating hours (see also recital (90) above) compared to a situation without the aid. It follows that without support the existing CHP plants would not have been operated anymore or the number of operating hours would have been significantly lower.

(351) Therefore, the Commission concludes that the measure has an incentive effect and facilitate the development of certain economic activities, as required by Article 107(3)(c) TFEU.

4.3.4.2. The aid is designed in order to limit its effects on competition and trade

A) Need for State intervention

(352) The Commission has further examined whether the aid measure is necessary to remedy a market failure that otherwise would have remained unaddressed. The studies and information provided by Germany show that the market alone and the ETS system would not have delivered, until the end of 2019, sufficient incentives to keep existing gas-fired highly efficient CHP installations in operation in the district heating sector or to keep the same level of CHP production (see recitals (88) to (89), as well as Table 29). There was thus a residual market failure that the aid measure concerned aimed at addressing.

(353) The Commission therefore considers that the measure is needed.

B) Appropriateness of aid

(354) The Commission further finds that the aid is appropriate to address the residual market failure. In particular, other forms of aid like investment aid or research aid cannot impact the decision of existing and already depreciated installations to continue operating after depreciation.

(355) In addition, had Germany tried to reach the same aim (maintain at least the same level of CHP production) with new investments, it would have had to significantly increase the level of the subsidy.

[84] See Judgment of 22 September 2020, *Austria v Commission*, C-594/18 P, EU:C:2020:742.

(356) The Commission therefore concludes that the notified aid measure is an appropriate instrument.

C) Proportionality of aid (operating aid for high energy efficient CHP)

(357) First, the aid is only granted for the production of cogenerated electricity (see point 133 (a) of the EEAG by analogy) limited to the difference between the operating costs and the market price of electricity as the LCOE calculations show (see also point 133 (b) of the EEAG). The Commission observes in particular that the calculations include all types of revenues that the CHP installation can obtain and exclude any investment costs. As Germany has at the same time created several categories, as opposed to the previous design of the scheme, in which the same fixed premium was applied to all installation sizes, the Commission considers that Germany has demonstrated that for each category, the applied fixed premium for the years 2018 and 2019 was limited to the difference between the operating costs and the market price (cf. Table 29).

(358) Second, the Commission considers the applied maximum rate of return of 8% appropriate, as set out in recital (183) of the 2016 decision and in recital (283) of the present decision.

(359) Finally, the evolution of costs has been monitored on an annual basis to verify that the operating costs are still higher than the market price of energy (see also point 133 (c) of the EEAG). When market conditions improved and less aid was needed, Germany revised the support level, which is the purpose of the present decision. Also, the scheme was limited to 16 000 full load hours and in time (until December 2019), as it was expected that after 2019 the market situation would have sufficiently improved.

(360) In the light of the above, the Commission concludes that the aid is proportionate.

4.3.4.3. Distortion of competition and balancing test

A) Positive effects

(361) The Commission notes that the scheme can be expected to have a range of positive effects because the eligible activities contribute directly to the development of the economic activity of electricity production from high-efficient CHP, and indirectly to environmental protection. Indeed, the aid has positive effects in terms of promotion of energy efficiency and protection of the environment. In this regard, the Commission notes that promotion of energy efficiency and energy saving is one of the aims of the Union’s policy on energy pursuant to Article 194 TFEU. Furthermore, high-efficiency cogeneration as promoted under this measure has been recognised by the Energy Efficiency Directive as having significant potential for saving primary energy and thus for energy efficiency.

B) Negative effects

(362) The distortions of competition on the heat market remain limited given that in the district heating sector, it is most of the time the same company that operates the CHP installations and the heat boilers and determines the mix based on which production is the less costly for the company. The subsidy thus essentially impacted the type of installation that was used rather than influencing the

company that would provide the heat. The impact is further limited by the fact that the aid is not linked to the heat generation and the aid remains lower than the difference between LCOE and the market price of the energy produced.

(363) The distortion of competition on the electricity market remains limited. The support was rather limited and was not sufficient to enable CHP installations in the district heating sector to continuously run, but improved their economic conditions so as to produce electricity during a certain number of full load hours, in particular at times of higher electricity prices, i.e. of higher electricity demand. In those production hours the CHP installation displaced electricity produced from more polluting plants and thus significantly reduced the CO_2 emission resulting from the electricity production, which is exactly the environmental purpose pursued by the measure.

C) Conclusions on distortion of competition and balancing test

(364) In light of the above, the Commission concludes that the aid to existing (depreciated) highly efficient gas-fired CHP installations in the district heating sector has significant positive effects in terms of facilitating an economic activity and of environmental protection while not leading to undue distortions of competition and trade. It follows that the positive effects of the aid outweigh its negative effects on competition and trade.

4.3.4.4. Conclusion with regard to the compatibility

(365) Based on the reasons set out above, the Commission concludes that the alteration of the support to existing (depreciated) highly efficient gas-fired CHP installations in the district heating sector facilitates the development of certain economic activities while not adversely affecting trading conditions to an extent contrary to the common interest, as required by Article 107(3)(c) TFEU. Therefore, the Commission has no reason to change the assessment already carried out in the 2016 decision.

4.3.5. CHP surcharge reductions for hydrogen producers

(366) 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'*.

(367) In addition, the EEAG stipulate compatibility conditions for aid in the form of reductions in the funding of support for energy from renewable sources. Whilst section 3.7.2. of the EEAG applies renewables surcharges and may not be applied directly to the reductions from other surcharges, the Commission has applied the compatibility criteria laid down in section 3.7.2. of the EEAG to surcharges aimed at financing the promotion of cogeneration by analogy in order to ascertain whether the measure complies with Art. 107 (3)(c) of the TFEU[85].

[85] For example in Commission Decision in State aid SA.38635 "Reductions of the renewable and cogeneration surcharge for electro-intensive users in Italy", OJ C 336, 06.10.2017; Commission Decision in State aid SA.42393 (2016/C) (ex 2015/N) implemented by Germany for certain end

(368) In this section, the Commission will, therefore, assess the aid measure directly under Art. 107 (3)(c) TFEU to see whether the design of the aid measure ensures that the positive effect of the aid on the development of the supported economic activity exceeds its potential negative effects on trade and competition. It will use the specific conditions in section 3.7.2. of the EEAG to establish whether the Treaty provisions are complied with.

4.3.5.1. Contribution to the development of an economic activity

(369) In accordance with Article 107(3)(c) TFEU compatible aid under that provision of the Treaty must facilitate the development of certain economic activities.

A) The economic activity concerned by the measure

(370) As outlined in recital (143) above the reduced CHP surcharge is granted to hydrogen producers belonging to the sector 'manufacture of industrial gases'. The current measure, therefore, targets the facilitation of the production of hydrogen.

B) Facilitation of an economic activity and incentive effect

(371) Point 182 of the EEAG specifies that undertakings particularly affected by the financing costs of renewable energy support could be put at a significant competitive disadvantage. The sectors listed in Annex 3 of the EEAG are identified as those that are particularly exposed due to their electro-intensity and their exposure to international trade in point 185 of the EEAG.

(372) The sector 'manufacture of industrial gases' to which the eligible hydrogen producers belong falls under Annex 3 of the EEAG. It should be noted that the CHP surcharge is charged in addition to the renewables surcharge. If one considers that already the renewables surcharge causes a competitive disadvantage to hydrogen producers, the CHP surcharge only aggravates this situation.

(373) Applying the full CHP surcharge to hydrogen producers, therefore, risks harming the pursuit of their economic activities. The measure foresees specific rules for hydrogen producers to encourage the market uptake of this innovative technology. The cost of a higher or full CHP surcharge could have encouraged undertakings to develop this technology in regions outside the EU or lead to a situation in which investments simply do not take place. The measure, therefore, has an incentive effect and facilitates the development of the economic activity of hydrogen producers in Europe to an extent that would have not happened without the intervention.

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consumers (reduced CHP surcharge) and SA.47887 (2017/N) which Germany is planning to implement in order to extend the CHP support scheme as regards CHP installations used in closed networks. OJ L 258, 06.10.2017, p. 127; Commission Decision in State aid SA.36511 (2014/C) (ex 2013/NN) "Support for EIU under the CSPE in France", OJ L 126, 15.05.2019, p. 20.

4.3.5.2. The aid is designed in order to limit its effects on competition and trade

(374) Whilst the State support granted to the hydrogen producers clearly facilitates their economic development and avoids relocations outside the European Union, the aid should not affect competition to an extent contrary to the common interest.

(375) The need, appropriateness and proportionality of a measure minimise the distortions on competition and trade. It, therefore, needs to be assessed in how far the measure fulfils these criteria.

(376) As outlined above, the measure facilitates the economic development of hydrogen producers. Hydrogen producers would have been put at a competitive disadvantage if they would have had to pay the full CHP surcharge, due to their energy-intensity and trade exposure. A reduction of these electricity costs therefore constitutes a targeted and appropriate measure to alleviate this disadvantage. The measure is also needed, as the eligible companies would otherwise not develop their economic activities to the same extent and risk relocating outside the EU.

(377) The proportionality of a measure further minimises the distortions of competition and trade. Points 188 – 190 of the EEAG provide that aid is proportionate if the beneficiaries pay at least 15 % of the additional costs without reduction. Member States can however further limit the costs resulting from financing aid to renewable energy to 4 % of the GVA of the undertaking concerned. For undertakings having an electro-intensity of at least 20 %, Member States can limit the surcharge to 0.5 % of the GVA of the undertaking concerned. Finally, when Member States decide to adopt the limitations of respectively 4 % and 0.5 % of GVA, these limitations must apply to all eligible undertakings.

(378) As outlined in recital (144) above, the CHP surcharge to be paid by hydrogen producers is in principle 15% of the full surcharge and is further capped at 0.5% of the GVA if the beneficiary has an electro-intensity of at least 20%. The level of the CHP surcharges paid by the hydrogen producers, therefore respects the limits set in points 188 and 189 of the EEAG.

(379) In addition, under the KWKG 2021 the reductions cannot lead to a CHP surcharge lower than 0.03 cent per kWh for the electricity consumed above the first GWh. This minimum surcharge is in line with the point 189 of the EEAG as the EEAG provide only for maximum reductions. Member States can grant less reduction provided the reductions are applied in a non-discriminatory way. As the 0.03 cent per kWh applies to the reduced CHP surcharge of all energy-intensive users, the latter criterion is fulfilled.

(380) For the calculation of the GVA, the KWKG 2021 follows the rules set up by the EEG 2021. It uses the GVA at factor costs and refers to the arithmetic mean over the most recent last 3 years for which GVA data is available in accordance with Annex 4 of the EEAG. For the calculation of the electricity consumption, Germany uses either the standardised consumption or the arithmetic mean over the last three years for which data on electricity consumption is available in accordance with Annex 4 to the EEAG. Finally, for the calculation of the

electricity price, the EEG 2021 uses average retail electricity prices, also in line with Annex 4 of the EEAG.

4.3.5.3. Distortion of competition and trade and balancing test

A) Positive effects

(381) Whilst the measure allows hydrogen producers to benefit from a reduced CHP surcharge and not others, this is based on the electro-intensity and the exposure to international trade of these undertakings, as well as the desire to encourage the market uptake of this novel technology. As the support is granted to alleviate the competitive disadvantage resulting from the undertakings' exposure, the impact on competition and trade is limited.

B) Negative effects

(382) As explained in recital (145) hydrogen producers find themselves in a different situation than other undertakings belonging to the 'manufacture of industrial gases' sector, in the sense that they operate a novel technology of which the government would like to encourage the market uptake. Whilst other beneficiaries belonging to the same sector also benefit from reduced CHP surcharge, the surcharge is more generous for hydrogen producers. This differentiated treatment of the hydrogen producers is justified, however, by the fact that they are in a different factual situation and the desire to ramp-up of the technology in Europe.

C) Conclusion on distortion of competition and trade and balancing test

(383) The Commission notes that the State support granted to the hydrogen producers in form of reduced CHP surcharges facilitates the economic development of the sector concerned and avoids relocations outside the European Union. It also finds that the impact on competition and trade has been limited by the fact that the measure is appropriate, necessary and proportionate and that the differentiated treatment of hydrogen producers is based on objective and transparent criteria and does not discriminate between undertakings in similar factual situation.

(384) The Commission, therefore, concludes that the positive effects of the reduced CHP surcharge for hydrogen producers outweigh the negative impact on the internal market. The measure does not, therefore, affect competition to an extent contrary to the common interest.

4.3.5.4. Conclusion with regard to the compatibility

(385) As the positive effects of the reduced CHP surcharge for hydrogen producers outweigh the negative impact on the internal market and as it meets the relevant criteria of the EEAG by analogy, the Commission concludes that the support granted to the hydrogen producers in form of reduced CHP surcharges is compatible with the internal market.

4.3.6. Transparency of the aid and firms in difficulty or subject to an outstanding recovery order

(386) According to point section 3.2.7 of the EEAG, Member States have the obligation to ensure transparency of the aid granted by publishing certain information on a

comprehensive State aid website. As explained above in recital (158), Germany indicated that this information is published and can be found on a website.

(387) As explained in recital (154) above, Germany confirmed that no aid can be granted to undertakings in difficulty and all firms that intend to participate in the scheme will have to provide a declaration that they are not a "firm in difficulty". The Commission notes that Germany intends to allow undertakings, which were not in difficulty on 31 December 2019 but became undertakings in difficulty in the period from 1 January 2020 to 30 June 2021 to participate in the scheme, in line with the amended EEAG. The Commission therefore considers that the scheme is in line with point 16 of the EEAG.

(388) Besides, as explained in recital (155), Germany has committed that no aid can be granted to undertakings subject to an outstanding recovery order following a previous Commission decision declaring aid illegal and incompatible with the internal market. The Commission therefore considers that the scheme is in line with point 17 of the EEAG.

4.3.7. Evaluation

(389) Point 28 and Chapter 4 of the EEAG state that the Commission may require that certain aid schemes be subject to an 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 their implementation is not reviewed in due time. Given its objectives, evaluation only applies for aid schemes with large aid budgets, containing novel characteristics or when significant market, technology or regulatory changes are foreseen.

(390) The present scheme fulfils the criteria of being a scheme with a large aid budget (cf. section 2.12) and containing novel characteristics; therefore it will be subject to an ex post evaluation.

(391) Germany has notified an evaluation plan, setting out the scope and modalities of the ex post evaluation. The plan is described in section 2.11 above with certain elements being further described in the following paragraphs.

(392) The Commission considers that the notified evaluation plan contains the necessary elements: the objectives of the aid scheme to be evaluated, the evaluation questions, the result indicators, the envisaged methodology to conduct the evaluation, the data collection requirements, the proposed timing of the evaluation including the date of submission of the final evaluation report, the description of the independent body conducting the evaluation or the criteria that will be used for its selection and the modalities for ensuring the publicity of the evaluation.

(393) The Commission notes that the scope of the evaluation is defined in an appropriate way, and adheres to the principles set out in the Commission Staff

Working Document on Common methodology for State aid evaluation[86]. It comprises a list of 23 evaluation questions with corresponding result indicators.

(394) Regarding the data used for the evaluation of the KWKG 2020, data sources are individually defined for each evaluation question. As mentioned in section 2.11, the 2020 evaluation report was insufficient, due to, in particular: (i) insufficient data to perform a quantitative evaluation, and (ii) failure to identify the causal impact of the aid.

(395) The Commission welcomes that Germany has committed to address the two above-mentioned shortcomings of the previous ex post evaluation in the evaluation of the KWKG 2020, and committed to an improved data gathering exercise. In a note dedicated to data collection exercise, the German authorities recognised the lack of adequate data in the past in order to perform a meaningful evaluation. A step-by-step approach has been put in place in order to improve the data on CHP plants. In the short run Germany will make better use of the MaStR and will check which additional information on CHP plants can be taken up in this database. Germany will also better cooperate with the BNetzA to obtain data on CHP plants that were unsuccessful in the tenders, which would enable the establishment of relevant control groups and hence the examination of the causal effects of the scheme. In the medium term (1 to 2 years), Germany will harmonise the data gathered by the BAFA and the network operators, so that data from different sources can be matched more easily. To tackle the problem of lack of data on heat networks and storage, an information obligation for district heating will be created. Finally, the Federal Statistical Office ('StBA') should in the near future also be able to collect data on individual CHP plants, in order to produce anonymised data on quantities, fuel type and energy generated by individual CHP plants. In the long term (3 to 5 years), the data collection on CHP output should be harmonised between the different authorities (MaStR, BNetzA, BAFA, StBA). Germany will also start up discussions with the 4 network operators in order to harmonise and gather the detailed data they possess (which is a complicated exercise since 900 DSOs report to one of the 4 TSOs in a non-harmonised way) and they will verify with the tax authorities which data can be collected there.

(396) Regarding applied methodologies, the Commission welcomes the general commitment by Germany to apply an empirical, and where relevant counterfactual, analysis, in order to assess the causal impact of the aid scheme on the behaviour of the beneficiaries. For the assessment of the direct and indirect effects of the aid, "top-down" and "bottom-up" approaches, as well as an analysis of the supply curves of individual tenders, are proposed for the evaluation of the revised CHP law.

(397) In the top-down analysis, a counterfactual scenario (market result without aid) is compared with an aid scenario (market result with aid) on the basis of a model about how the market works and reacts.

[86] Staff Working Document on Common methodology for State aid evaluation, SWD(2014) 179 final.

(398) In the bottom-up analysis, a group of aid recipients (treatment group) is selected on the basis of the auction results of the BNetzA and compared with a control group that has properties that are as similar as possible. Bidders who have not been awarded a contract in the same tender can serve as a control group, provided that the tender was not undersubscribed. The decisive indicator for assessing the effectiveness of the aid is the comparison between the behaviour of the treatment group and the control group. Whether or not a CHP investment has been made can be derived from the MaStR. The methodology proposed by Germany is to carry out a regression analysis ("Regression Discontinuity Design (RDD)"). Before the amendment of the KWKG 2016, the support under the KWKG was so extensive that almost no CHP plants were operational without aid. It is expected that after the amendment a small[87] but increasing number of CHP installations are operational without support under the KWKG, so that relevant control groups can be established. In this respect, Germany committed to make use of tender data under the KWKG 2016 (including all tenders as of 1 December 2017) in order to increase the number of data points for the empirical analysis.

(399) In the supply curve analysis, the supply curves formed by the bids received in individual tenders will be analysed in more detail on the basis of the tender data. The slope of the constructed supply curve or curves allows a comparative static analysis of price and cost effects of an exogenous change in the tender volume. Such analysis is based on the assumption that bidding behaviour does not depend on tender volume, which appears reasonable if there is a sufficiently high level of competition and the change in the tender volume considered is not too big. Subject to this assumption, supply curves can inform the evaluator on the effectiveness of the aid.

(400) The Commission holds the view that the proposed methods are based on established ex post counterfactual or empirical evaluation principles to assess the causal effects of the aid. While the top-down analysis will use aggregate data and compare it to a counterfactual derived from modelling, the bottom-up analysis and supply curve analysis are empirical approaches based on data at project level for both successful and unsuccessful bids which gives insights into the distribution of outcomes (not only averages).

(401) The Commission welcomes that the following new features of the KWKG 2020, as compared to the KWKG 2016, are assessed. First, Germany will analyse the effect of the various newly introduced bonuses (the innovative RES heat bonus, coal-switch bonus). Second, Germany will also assess the effect of lowering the threshold for participation in tenders (from 1 MW to 500 kW) and the reduction of tendered quantities in case of undersubscription of the tenders.

(402) The Commission also welcomes Germany's commitment to carry out a study on the discount rates used in the LCOE calculations for setting the administratively set fees and in the bid caps of the tenders. The Commission notes that the rates or return (of 20 to 30% for certain sectors) currently applied exceed the usual range

[87] Germany observes that the number of unsubsidised CHP plants is expected to be still very small at this stage, due to long timeframes for CHP investment projects. So there will be a transitional period in which the number of unsubsidised plants will still be significant.

and therefore have to be studied in particular depth and regularity to avoid overcompensation. It welcomes that Germany took up this element in the improved evaluation plan. This review of the rates of return used for the LCOE calculations is foreseen in 2021 and a report with the conclusions will be submitted to the Commission in 2022. In case the report comes to the conclusion that the discount rates currently applied are too high, Germany commits to revise the LCOE calculations for the administratively set fees and the bid caps, and implement the changes immediately, i.e. before the end of the scheme.

(403) In addition, the evaluation will also allow assessing the cost of abatement (in EUR/tCO_2) of the subsidy scheme as a whole and of individual technologies, a highly relevant parameter for assessing the efficiency of the decarbonisation scheme and for the design of future aid schemes.

(404) 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.

(405) 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 2022, which will update the Commission on the progress with data collections and the progress to apply the targeted methodologies mentioned above. In line with the principle of loyal 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.

(406) The Commission therefore considers that the notified evaluation plan meets the requirements in EEAG point 28 and Chapter 4.

5. CONCLUSION

The Commission has accordingly decided not to raise objections to the following aid measures on the grounds that they are compatible with the internal market pursuant to Article 107(3)(c) of the Treaty on the Functioning of the European Union:

- the support to new, modernised and retrofitted highly efficient CHP installations as described in section 2.2, for aid granted until 31 December 2026;
- the support to heat/cooling storage facilities as described in section 2.4, for aid granted until 31 December 2026;
- the support to energy-efficient district heating/cooling networks as described in section 2.5, for aid granted until 31 December 2026;
- the support to existing highly efficient gas-fired CHP installations in the district heating sector as described in section 2.3 for aid granted until 31 December 2019; and
- the reduction in CHP surcharge levied on hydrogen producers as described in section 2.8, for aid granted until 31 December 2026.

The Commission reminds the German authorities that, in accordance with article 108 (3) TFEU, any plans to refinance, alter or change this aid have to be notified to the Commission pursuant to provisions of the Commission Regulation (EC) No 794/2004 implementing Council Regulation (EC) No 659/1999 laying down detailed rules for the application of Article 93 of the EC Treaty (now Article 108 TFEU).[88]

The Commission further reminds Germany that individual aid granted on the basis of the scheme remains subject to the notification obligation pursuant to Article 108(3) of the Treaty if the aid exceeds the notification thresholds set in point 20 of the EEAG and is not granted on the basis of a competitive bidding process.

The Commission also reminds the German authorities that the final evaluation report must be submitted by 31 March 2026 at the latest.

Yours faithfully,

For the Commission

Margrethe VESTAGER
Executive Vice-President

88 OJ L 140, 30.4.2004, p. 1.