

Report D4.1, December 2015

Auctions for Renewable Energy Systems in Germany: Pilot scheme for ground-mounted PV



HORIZON 2020

About the project

Auctions for Renewable Energy Support: Effective use and efficient implementation options (AURES)

This project helps assessing the applicability of different auction types to renewable support under different market conditions. It also explores which auction types and design specifications suit particular requirements and policy goals in European countries. By establishing best practices and a knowledge sharing network, we contribute to informed policy decision-making and to the success of auction implementations across Europe.

Target-oriented analysis: Through analysis of empirical experiences, experiments and simulation, we will create a flexible policy support tool that supports policy makers in deciding on the applicability of auction types and certain design specifications for their specific situation.

Capacity building activities: We undertake specific implementation cases to derive best practices and trigger knowledge sharing amongst Member States. We strive to create a strong network with workshops, webinars, bilateral meetings, newsletters, a website that will serve as capacity building platform for both policy makers and market participants (including project developers, auctioneers, etc.). Wherever required, we can set up specific bilateral and multilateral meetings on specific auction issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals.

Project consortium: eight renowned public institutions and private firms from five European countries and combines some of the leading energy policy experts in Europe, with an impressive track record of successful research and coordination projects.

This report deals with the ongoing pilot auction for ground-mounted PV plants in Germany.

The report contributes to the first and second of three tasks in work package 4 of the AURES project:

T4.1 Providing a characterisation of the different auctions

T4.2 Making an assessment of auctions and case-specific lessons learnt

T4.3 Interpreting and summarise the general lessons learnt and resulting and thereby outline specific recommendations

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Project deliverable:

WP4 - Empirical aspects of auctions for RES-E: Learning from real experiences.

Task 4.1 Characteristics of auctions

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1. Characterisation of auctions in Germany

Table 1: Characterisation of auctions in Germany

Characteristics	Description
Country characteristics	<p>Germany aims for a share of 40-45% of electricity consumption from renewables by 2025, 55%-60% by 2035, and at least 80% by 2050, compared to 25.5% in 2014. The Renewable Energy Sources Act 2014 (EEG 2014) breaks down the shares into technology specific targets: Yearly additions of 2,500 MW wind onshore capacity (net extension) and new installations of 2,500 MW PV per year (gross extension). The targets for wind offshore were reduced to overall 6,500 MW by 2020 (the original goal was 10,000 MW) and 15,000 MW by 2030. Targets for biomass were reduced to 100 MW new installations per year (gross extension).</p> <p>In 2013, Germany was above its indicative trajectory to reach the 2020 targets for renewable electricity use, the Renewable Energy Progress Report finds.¹</p>
Market characteristics	<ul style="list-style-type: none"> • Liberalised electricity market with substantial over-capacity and decreasing average wholesale prices • Support of renewable energy sources for electricity (RES-E) via a floating feed-in premium that is financed by a surcharge on electricity bills • Wind onshore market is viable and capacity additions exceed planned targets of the government • PV and bioenergy markets currently in crisis with very low additions taking place in 2015.
Name of auction scheme	<p>Ground-mounted PV Auction Ordinance (PV-Freiflächenverordnung), which is a supplement to §55 of the EEG 2014. Auction schemes for other technologies (wind onshore, wind offshore, large rooftop-mounted PV) are currently in the making and should start by 2017 at the latest, according to §2 (5) of the EEG 2014</p>
Objectives	<p>The objective is to determine the required level of support in a competitive manner, and to manage the capacity expansion of renew-</p>

¹ COM(2015) 293 final

	<p>ables while staying on track with targets. Besides, auctions should be designed in a way that allows a variety of market players to participate (§2 (5) EEG 2014).</p> <p>The pilot scheme for ground-mounted PV plants should allow for the gathering of information on and experience with renewable energy auctions. The Federal Government has to report to the German Parliament by 30 June 2016 at the latest on the experience made.</p>
Contracting authority	Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (<i>Bundesnetzagentur, BNetzA</i>)
Main features	<p>Auctions for ground-mounted PV plants take place three times a year. Capacity is auctioned (in MW). Support is paid in the form of a floating premium. Bidders need to specify the size of their projects (min 100 kW, max. 10 MW) and the level of the strike price of the floating premium (in EUR / kWh), i.e. the constant sum of average market price + floating premium, which they would like to receive for a specific project for 20 years. Bids are evaluated based on price only. In order to qualify, bids need to specify the location of the project and include proof of certain project planning stages. There are some restrictions regarding the location of projects.</p>
Year of introduction	<p>The EEG 2014 was adopted in August 2014. The pilot scheme was adopted by the cabinet on 28 January 2015 and published in the Federal Law Gazette on 11 February 2015. The first auction round was held in April 2015.</p>
Technology focus and differentiation	<p>The auction scheme is technology specific. Only ground-mounted PV plants may participate. It is a pilot scheme and experiences should inform the ongoing process of finding a suitable auction scheme for other technologies (expected to become effective from 2017 onwards).</p> <p>They will most likely be technology specific yet plans exist for a joint auction for large rooftop mounted PV plants (> 1M) and ground-mounted PV plants².</p>
Lead time before auction	<p>Three month before the first auction round, the law specifying the auction design was adopted by the parliament. A public consultation</p>

² BMWi (2015), *Eckpunktpapier*, Ministry of Economic Affairs and Energy, available at: http://www.erneuerbare-energien.de/EE/Redaktion/DE/Downloads/Hintergrundinformationen/eckpunktepapier-ausschreibungen-erneuerbare-energien-anlagen.pdf?__blob=publicationFile&v=3

	<p>that took place in July and August 2014 proceeded the finalisation of the law. The main features of the design were therefore known to the sector around nine month before its introduction.</p> <p>Details on each auction round are published on BNetzA's website about eight weeks in advance. They include the specific volume per auction round.</p>
Min. / max. size of project	Bids must amount to 100 kW at the least and may not exceed 10 MW. There is no maximal bid size per actor. .
What is auctioned?	In line with the development corridor (<i>Ausbaukorridor</i>) that is specified in the § 3 of the EEG 2014, BNetzA defines the amount of capacity (in MW) for which bidders may compete in one round. Successful bids receive a floating feed-in premium for the duration of 20 years after commissioning (§ 22 EEG 2014).
Budgetary expenditures per auction and per year	There is no overall budget, since the support for renewables is financed by the end user via a levy on the electricity bill. The policy costs of the support for renewables (not specific to the auction scheme for ground-mounted PV plants) are substantial. For 2015, German TSOs estimate support payments of €26.9 billion.
Frequency of auctions	Annually, three auctions are planned. They follow a fixed schedule (1 April, 1 August, and 1 December).
Volume of the tender	<p>The ground-mounted PV Auction Ordinance specifies the volume of each auction round. It will decline slightly over the years:</p> <p>1st auction round (April 2015): 150 MW, 2nd auction round (August 2015): 150 MW, 3rd auction round (December 2015): 200 MW, 4th auction round (April 2016): 125 MW, 5th auction round (August 2016): 125 MW, 6th auction round (December 2016): 150 MW, 7th auction round (April 2017) : 100 MW, 8th auction round (August 2017): 100 MW, and 9th auction round (December 2017): 100 MW.</p>
Auction design elements	See Fejl! Henvisningskilde ikke fundet..*

Design elements for the assessment of auction schemes for RES-E

Table 2: Design elements of auction schemes in Germany

Design elements	
Single- or multiple-item auctions	Multiple-item auction
Auction procedure	The pilot scheme is a static sealed-bid auction. Bidders submit a sealed bid to the BNetzA. The BNetzA checks compliance with the prequalification criteria and excludes offers that exceed the price ceiling or did not hand in a first financial security (first bid bond). The BNetzA ranks eligible bids according to the offered price (corresponding to the feed-in premium, see above). Based on this ranking, the BNetzA determines the bids that are needed to fill up the auctioned volume. Once successful bidders are notified, they have to hand in a second, higher security for the penalty (second bid bond). If successful bidders do not submit this penalty, the awarded support rights are withdrawn and the volume may be awarded to the next-ranked, previously unsuccessful bidder.
Pricing rules	Bids are awarded on a pay-as-bid basis, with the exception of two rounds in 2015 which apply a uniform pricing rule (pay-as-cleared) to gain experience with the uniform pricing rule. In these exceptional rounds all bidders receive the financial support that corresponds to the highest successful offer
Ceiling price	A ceiling price is set for each auction round. The ceiling price equals the current support level for roof-mounted PV plants pursuant to Sections 51 §2 no. 3 and 31 § 1 to 5 of the EEG 2014. The ceiling price for the first round was set at €11.29 cent / kWh and for the second round at €11.18 cent / kWh.
Qualification criteria	The size of ground-mounted PV plants needs to be between 100 kW and 10 MW. Bids have to specify the location at which the project is planned. To qualify, bids have to include a planning approval by the responsible authority. If the planning approval is preliminary, bidders have to provide double the bid bond. The Ordinance only allows bids for project on specified types of locations. The restriction should avoid that land with a high value for agriculture is used for PV plants. Produced electricity may not be used for self-consumption during the

	entire funding period (regardless of the owner of the specific plant).
Penalties	<p>In case the project is not commissioned within 24 month, the contract expires and the bidder needs to pay a penalty. The penalty depends on the state of planning in which the PV plant was in when the bid was made. If only a preliminary planning approval was provided as prequalification, the penalty amount to €50 / kW. If the planning approval was not preliminary, the penalty is halved. To make the penalty effective, it has to be secured by a bid bond, so called second bid bond. The second bid bond has to be handed in right after the bidder has been informed about its successful participation.</p> <p>Additionally, a so called first bid bond of €4 / kWh has to be provided as a security which comes effective in case the bidder withdraws a successful bid i.e. does not hand in the second bid bond.</p> <p>If the project is not commissioned within a period of 18 month, the feed-in tariff decreases by €0.3 cent / kWh.</p>
Monitoring of realisation progress	There are no intermediary mile stones to monitor the development of successful bids. In case projects are not realized the BNetzA may increase the volume of proceeding auction rounds.
Exceptions from requirements for small plants/developers?	There are neither exemptions based on the type of the developer nor on the size of the plant.
Different options regarding what is effectively tendered and what is asked for as bids	Capacity is tendered. Bidders offer a price per kWh. Projects are selected that perform best on the price per kWh
Transferability of support right	Awarded contracts are provider-specific, which means that a successful bidder may transfer the support rights from the winning project to another project within its own portfolio (at the expense of a small penalty), but is not allowed to sell the support rights to a different party. The possibility to sell an entire project re-

	mains valid.
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2. Evaluation criteria for the assessment of auction schemes for RES-E

As of September 2015, the BNetzA conducted two auction rounds (15 April 2015, 1 August 2015). Summaries of the results are publically available³. In 2016, the German Government has to provide a detailed evaluation report to the German Bundestag. The following is therefore a preliminary assessment.

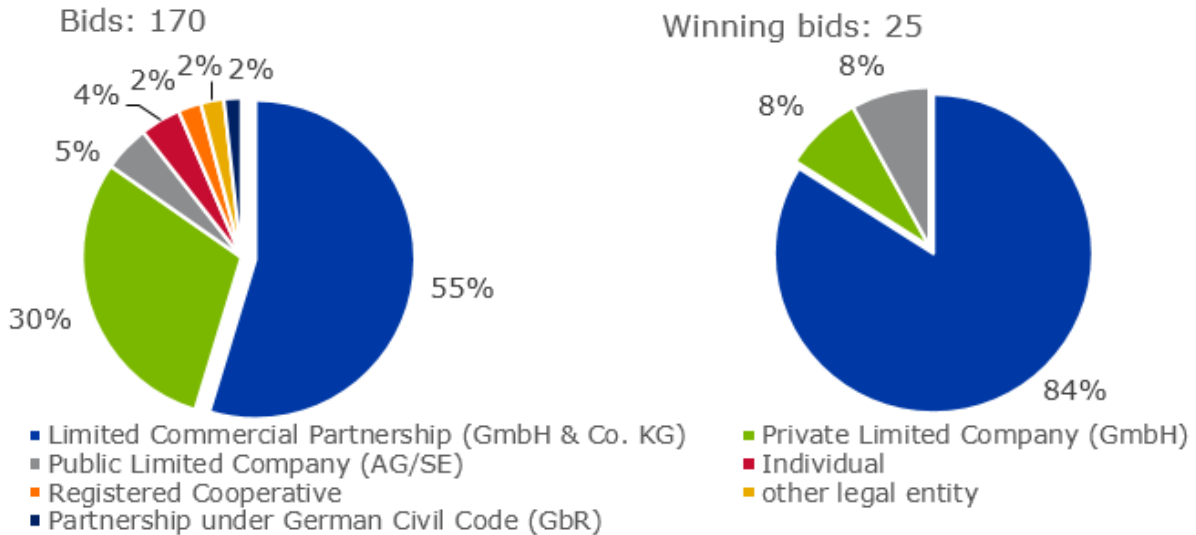
Actor variety and social acceptability

All actors participate on equal conditions, regardless of the type or size of the participant. To increase the acceptance of the scheme, different planning stages allow for the participation in the auction: If the project planning is more advanced, the second financial security, which might be a hurdle for smaller actors, is halved.

In the first round, 170 bids were received. Two thirds were made by Limited Commercial Partnerships (GmbH & Co.KG) and Private Limited Companies (GmbH), which may be associated to professional project developers. Neither cooperatives nor individuals were among the 25 winners. 37 bids had to be excluded for formal reasons.

³ First round: BNetzA (2015), *Hintergrundpapier - Ergebnisse der ersten Ausschreibungsrunde für Photovoltaik (PV) – Freiflächenanlagen*, Bundesnetzagentur, available at: http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/ErneuerbareEnergien/PV-Freiflaechenanlagen/Gebotstermin_15_04_2015/Hintergrundpapier_PV-FFA_Runde1.pdf?__blob=publicationFile&v=2 ; Second round: BNetzA (2015), *Hintergrundpapier - Ergebnisse der zweiten Ausschreibungsrunde für Photovoltaik (PV) – Freiflächenanlagen*, Bundesnetzagentur, available at: http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/ErneuerbareEnergien/PV-Freiflaechenanlagen/Gebotstermin_01_08_2015/Hintergrundpapier_PV-FFA_Runde2.pdf?__blob=publicationFile&v=3

First round



Second round

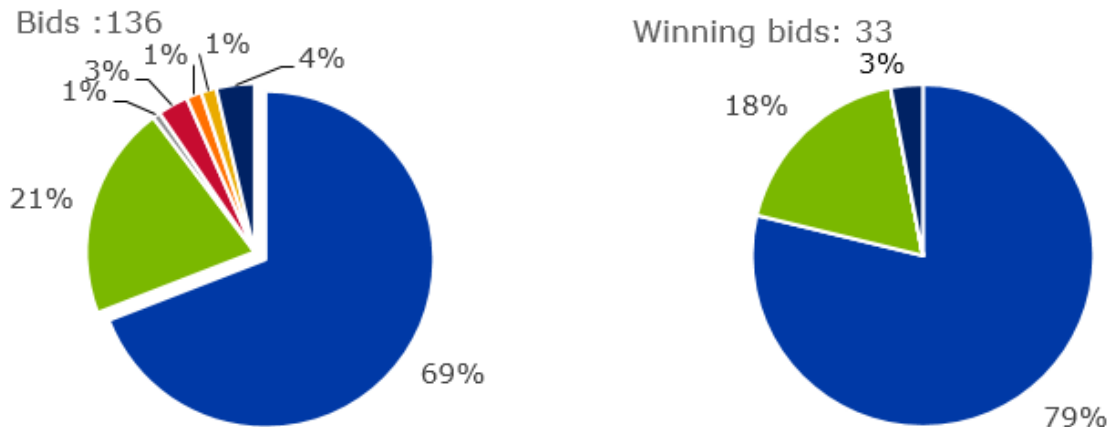


Figure 1: Comparison between participating actors (own graph based on data provided by BNetzA 2015)

In the second round, 136 bids were made. As in the first round, the large majority came from professional project developers. Again, neither cooperatives nor individuals were among the 33 winners.

It is very difficult to track links between companies. It is therefore possible that both cooperatives and individuals are professionalised actors, and that some of the winning bids may be associated to smaller companies. Both in the first and second round, some successful bids may be associated to the same group. For example, in the first round, three groups account for 45% of the successful bids and could secure 61% of the tendered volume.

Given that participants in a survey by the German Solar Association perceived the auction procedure as rather transparent and accessible, the results strengthen the concern that an auction does not per se excludes smaller players but that smaller player have a very low likelihood to be successful and may

therefore abstain in the long run. The variety of actors could be further reduced as actors refrain from participation given the high level of competition and consequentially low likelihood of success. Conclusive answers cannot be obtained from the results of the first two action rounds alone.

Policy effectiveness (effectiveness of auctions)

In the context of the two pilot rounds, policy effectiveness may be measured by two indicators: First, the relation between auctioned volume and the volume of the bids, and second, the realisation rate of successful projects.

In the first round, 170 bids with a total of 715 MW were made. 37 bidders had to be excluded for formal reasons. The auctioned volume of 150 MW was still exceeded four times. In the second round, 136 bids with a total of 558 MW were made. 15 bids had to be excluded for formal reasons. The auctioned volume of 159 MW was exceeded threefold. To meet the target set by the EEG 2014, a sufficient number of projects participated in the auction. Therefore, the policy has the potential to be effective.

The consecutive question concerns the realisation rate of the successful bids. On April 29th, 2015, the BNetzA announced the results of the first round and notified the winner. Winners had ten working days to accept by handing in a second financial security, which all of the successful bidders did. As for the second round, the BNetzA announced the winning bids on August 13th (announcement of uniform price on September 1st to avoid speculative while having to hand in the second security). 32 out of the 33 successful bidders handed in the second financial security. Thereby successful bidders proved their willingness to realise the projects, both in the first and second round.

Regarding the actual realisation and its timing, however, significant uncertainties persist. Some bids will receive a support level which is below the current EEG support level (see **Fejl! Henvisningskilde ikke fundet.**). It is likely that these projects will only be realised at the end of the realisation period as they probably speculate on decreasing module prices in the coming months. In case module prices do not decrease, there is a chance that these projects will not be realised at all, which would decrease the effectiveness of the auction scheme.

Static efficiency or cost effectiveness (including transaction and administrative costs)

The static efficiency measures if the predefined target can be fulfilled at the lowest possible overall costs. The combined target of the first two rounds is to support the construction of 300 MW of ground-mounted PV plants.

The average price of the first auction round was €9.17 cent / kWh (min: €8.48 cent / kWh, max: €9.43 cent / kWh) which is significantly below the ceiling price of €11.29 cent / kWh but exceeds the administratively set support level of the EEG 2014 of €9.02 / kWh (April 2015) (see **Fejl! Henvisningskilde ikke fundet.**3). In the second round, the support level declined. The uniform price was as low as €8.49 cent /

kWh and was therefore below the administratively set support level for September 2015, which is €8.91 cent / kWh.

The first auction round may have led to cost efficient results, if projects are realised in the coming month, even though the average support price of €9.17 cent / kWh exceeds the administratively set price. **Fejl! Henvisningskilde ikke fundet.** shows that the annual capacity additions rapidly declined after the administratively set support level was reduced in 2012. It may be argued that the administratively set support level was insufficient to cover the LCOE and incentivise the construction of ground-mounted PV plants. Hence, the result of the auction may be in line with the lowest possible overall costs and therefore efficient even though underbidding may have happened.

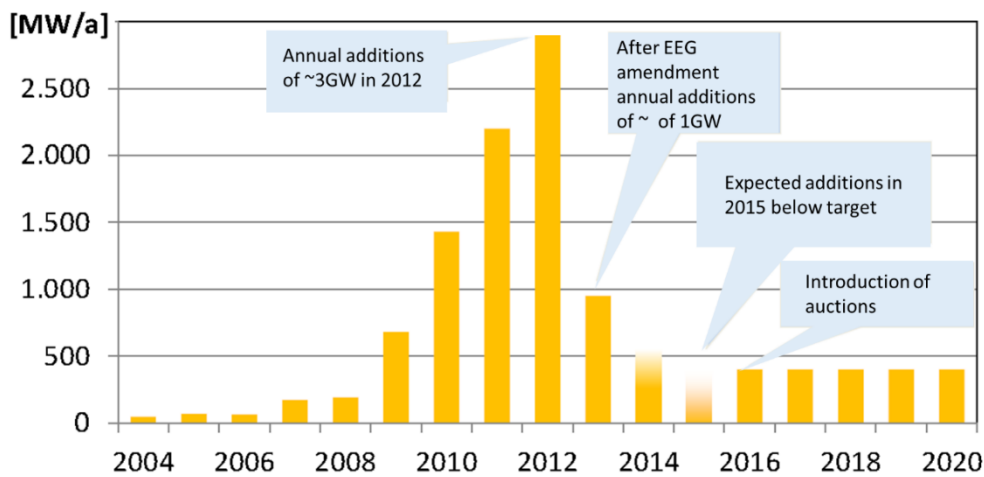


Figure 2: Annual capacity additions of ground-mounted solar plants (Source: Kehl et al. 2014)⁴

The quite low price of the second round likely is a response to the quite fierce competition and could indicate an efficient result as only the cost efficient projects will be supported. However, neither this uniform price nor the minimum price of €8.48 cent / kWh in the first round are a proof of an efficient support scheme. Successful projects do not have to be realised right away. The realisation period (including a tolerance of 6 month) is two years. It is likely that the bidders will defer the construction and wait for falling PV prices (e.g. because duties on Chinese panels are lifted). If a plant is constructed in the future, it may receive a higher level of support than under the old EEG 2014 (under the exemption of a digression according to the capacity expansion corridor).

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⁴ Kelm, T.; Dasenbrock, J.; Günnewig, D. et al. (2014), Vorbereitung und Begleitung der Erstellung des Erfahrungsberichts 2014 gemäß § 65 EEG, Vorhaben IIc, Stromerzeugung aus Solarer Strahlungsenergie, gemeinsamer Zwischenbericht von ZSW, Fraunhofer IWES, Bosch & Partner, Februar 2014

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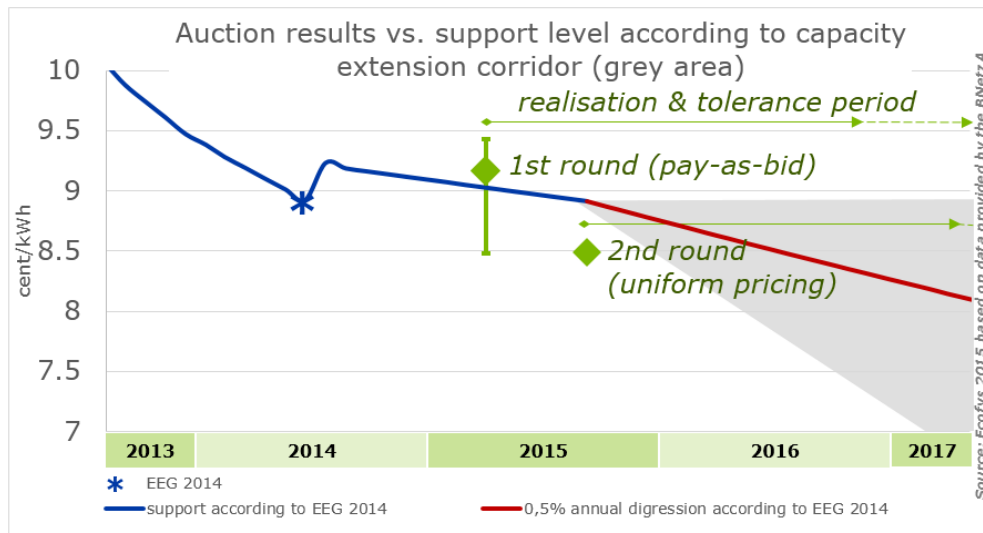


Figure 1: Comparison between support level as set by the EEG and the results of the auction rounds.

Dynamic efficiency

The auction is a technology-specific auction for ground-mounted PV plants. Innovative concepts may in principle participate in the auction but will not receive preferential treatment. Innovative and less mature technologies in the form of pilot projects will more likely be supported by a different policy that is to be designed.

As the projects may be realised within the next two years, a successful bidder has quite substantial investment security over the next two years. As projects are allowed to participate in an early stage of the project planning, successful bidders will try to realise the project at the lowest possible cost, which incentives (small) investments in increasing the efficiency of the project and could therefore lead to dynamic efficiency gains on a small scale. If all successful bidders speculate on falling prices (e.g. module prices), however, some projects will be realised in the short run. As a consequence, deployment rates would suffer and innovation may be hampered.

Compatibility with market principles and integration

The auction procedure was implemented to comply with European State Aid Guidelines. The auction is solely a mechanism to determine the level of support in a competitive manner and does not address additional questions of system or market integration of renewables. Regardless of the auction, PV plants have to first sell their electricity on the electricity market, which is in line with the principle of market integration of RES. The EEG 2014 addresses these questions in other sections. The scheme is not yet open to other countries but the German Government plans to open 5% of the support scheme to electricity produced abroad.

Distributional effects & minimisation of support costs

Under distributional effects, it is typically analysed whether financial support is suited to the actual generation costs of the technology or whether higher support payments for low-cost generation technologies may lead to windfall profits for renewable power plant operators.

The auction scheme should aim to allocate support only to those projects that could not otherwise be realised and thereby avoid windfall profits for renewable power plant operators. As discussed under efficiency, windfall profits are unlikely in the pilot auction (fierce competition, administratively set support level was not sufficient) but possible if the realisation is delayed while prices fall.

Regarding the distribution of benefits, the auction led to a concentration of winning bids in the East and South of Germany, especially in Brandenburg (see **Fejl! Henvisningskilde ikke fundet.4**), which is in accordance with previous deployment of ground-mounted PV plants, the BNetzA finds. The unequal distribution across Germany could lead to a political debate on a fair distribution in the future, but since the situation has not changed compared to the past, it is unlikely that that this issue will become a major topic. Compared to the EEG 2014, the distribution of cost does not change and will still be covered for by a surcharge on the electricity bill.

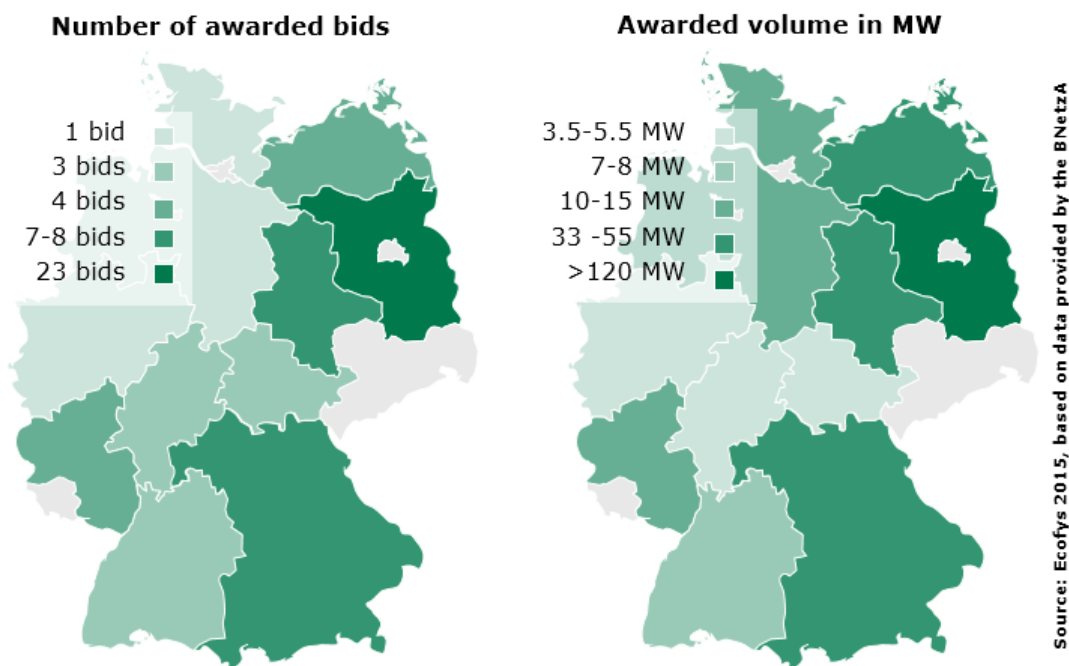


Figure 4: Regional distribution of winning bids from first and second round

3. Some preliminary suggestions for lessons learnt: key best practices and pitfalls identified

- The number of received bids far exceeded the tendered volume, which indicates that there is sufficient competition and that market participants see the auction scheme as an opportunity rather than a threat.
- A high level of competition can be realised in technology-specific auctions as it seems to depend more on sector specific characteristics (e.g. previous level of support and number of market participants).
- Almost all successful bidders handed in a second security which shows their willingness to realise the project. That suggests that the realisation rate and thereby the policy effectiveness will be high.
- The strike prices of the first two auction rounds do not allow conclusive statements on the efficiency of the auction. In Germany, the previously administratively set support level may have been too low which would justify increasing prices. Lower prices in the 2nd round may result from speculations on falling module prices, fierce competition, the pricing rule, potential underbidding, and other causes.
- The relatively long realisation period gives successful participants the opportunity to delay the realisation. The actual effectiveness and efficiency can only be evaluated after this period of two years. If prices for solar PV modules continue to fall and successful participants delay the realisation to the end of the realisation period, the current support level might be higher than necessary. On the other hand, the winning bidders might already have expected such price decreases. Some market participants also claim that bidders deliberately bid below their actual costs (“underbidding”), but this cannot be verified.
- Auctions with a relatively long realisation period may incentives investments that could lead to short-term dynamic efficiency gains.
- It remains to be seen if the scheme is open for different actors or if smaller actors are crowded out due to the high competition.