Technical University of Denmark

Recommendations on the role of auctions in a new renewable energy directive

Kitzing, Lena; Islam, Marco; Soysal, Emilie Rosenlund; Held, Anne; Ragwitz, Mario; Winkler, Jenny; Steinhilber, Simone; del Río, Pablo ; Wigand, Fabian; Tiedemann, Silvana; Klessmann, Corinna; Busch, Sebastian ; Ortner, André ; Kreiß, Jan; Fitch-Roy, Oscar; Woodman, Bridget

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Authors:

Lena Kitzing, Marco Islam, Emilie Rosenlund Soysal (DTU)

Anne Held, Mario Ragwitz, Jenny Winkler, Simone Steinhilber (Fraunhofer ISI)

Pablo del Río (CSIC)

Fabian Wigand, Silvana Tiedemann, Corinna Klessmann (Ecofys)

Sebastian Busch, André Ortner (TU Wien)

Jan Kreiß (Takon)

Oscar Fitch-Roy, Bridget Woodman (University of Exeter)

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Executive Summary

During the work in the AURES project, we have found evidence that auctions can be a suitable instrument for allocating support under budget and volume limitations and can achieve significant short-term efficiency gains, but it has not been proven that auctions in general are better suited to support renewable energy than other support instruments.

The use of auctions entails several new implications that often policy makers have not had to deal with before: ensuring sufficient competition for a well-functioning price formation, avoiding undesired strategic incentives, collusion and other market distortions, and importantly dealing with risk of low realisation rates, e.g. caused by underbidding or the existence of non-cost barriers. Often, the specific design solutions for these issues are highly context-specific and what works in one market is not necessarily applicable to another. In addition, different design elements might mitigate some issues but affect other factors, e.g. pre-qualification rules and penalties can increase realisation rates but can also increase the risk and thus the costs for bidders. In addition, policy makers often pursue other policy goals (secondary objectives) with energy support policy, e.g. increasing security of supply or encouraging actor diversity. Finding a compromise between encouraging different policy goals without compromising on well-functioning price formation, proves to be a challenging task. Overall, auctions are only just emerging as instrument for allocating support of renewables and experiences so far are rather limited and mixed.

Because of different market conditions, ongoing institutional learning processes and specific policy goals, we find that auction rules must be adaptable, and should therefore not be too restrictively determined in European level legislation. On the other hand, we find that there is a good case for addressing auctions in the new renewable energy directive (further referred to as REDII), in order to give guidance to the member states (further referred to as MS), encourage the application of best practices and help avoiding some of the many pitfalls related to auction design.

For auctions, as with any other instrument, the typical principles of good policy making apply: a strong, long-term policy framework is beneficial, with predictable developments. Retroactive changes should be avoided.

Summary of recommendations for the role of auctions in REDII:

Technology-neutral vs. technology-specific auctions:

- A trade-off exists between designing an auction technology specific and technology neutral. Whether the advantages or disadvantages of technology-neutrality prevail depends on the level of technology costs, the market potential, technology differences in system integration costs and technology maturity.
- REDII should allow for the application of technology-specific auctions so that auction design can be adapted to the specific needs of individual RES-technologies.
- Technology clusters may be an option to foster competition between technologies instead of using pure technology-neutral auctions.

Exemptions, alternatives to auctions:

- REDII should allow de minimis rules on three grounds: type of actor, size of actor and size of projects.

- Exemptions for immature technologies and immature markets should be allowed. We do not recommend the use of auctions for demonstration projects.
- REDII should give clear and unambiguous definitions on exemption rules.
- In the expectedly rare cases that a thorough impact assessment ex ante predicts poor performance of an auction and no reasonable mitigation options exist, MS should be allowed to employ alternative support instruments (such as administratively set tariffs or premiums) independent of the exemption rules set out above.

Auction type:

- We suggest REDII not to prescribe any specific auction type.
- We recommend REDII to require auctions to fulfil at least three criteria: 1) bids are binding, 2) best bids win, 3) winners receive at least their bid price.

Auction schedule and frequency:

- REDII should require MS to 1) publish a long-term auction roadmap, 2) publish more detailed auction plans for shorter time horizons, and 3) set up appropriate monitoring systems.
- REDII should not prescribe any specific frequency of auctions.

Auction volumes and limits:

- REDII should allow MS to choose between generation-based and capacity-based volume setting in auctions. Budget caps may also be chosen if politically desired, but represent a less preferred option.

Auction procedures:

- REDII should require MS to set up appropriate processes and participation enhancing measures. This can include e.g. 1) process for stakeholder consultation, 2) sufficient consultation time, 3) sufficient time for bid preparation. In any case, project realisation time should be reasonable and consider typical project development cycles.

Maximum / ceiling price:

- We recommend that REDII requires MS to set ceiling prices that reflect market conditions and an assessment of the levelised cost (LCOE) of the technology.

Pre-qualification requirements and penalties:

- REDII should require MS to implement both pre-qualification requirements and penalties. We recommend leaving it open to each MS to decide on their specific design and levels.
- Further, it is advisable to require pre-qualifications to be supported and justified by sufficient arguments in order to ensure transparency and to avoid an illegitimate exclusion of bidders.

Selection criteria: price and potential secondary objectives:

- We recommend that REDII explicitly mentions price as a preferred selection criterion.
- MS should be allowed to consider further policy objectives within the auction design, particularly if required for public acceptance and reducing overall system cost.

- REDII should require MS to provide a detailed description and a reasoning of secondary objectives in auctions to provide a sufficient transparency level. In addition, the achievement of these secondary objectives should be measurable.

Seller concentration rules:

- It should be left for MS to decide whether to apply any seller concentration rules and, if applied, which type to opt for.
- REDII could mention maximum size limits on bids as best practice, without mentioning any specific levels.

Cross-border auctions:

- REDII should provide a description of the options for cross border auctions as a guideline for MS who would like to cooperate.
- It might be too early to fully enforce cooperation between MS at this point in time. We are thus in favour of a solution in which REDII requires that MS always investigate cross-border auctions as an option (i.e. in relation to mitigating suboptimal market conditions), but where the actual implementation is voluntary or based on sensible rules to gradually increase cross-border participation.

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1 Auctions as a suitable instrument for REDII

The AURES project midterm results confirm the increasing relevance of auctions in renewable energy support. Auctions can be a suitable instrument for allocating support under budget and volume limitations and can achieve significant efficiency gains, but it has not been proven that auctions in general are better suited to support renewable energy than other support instruments.

Auctions can be a suitable instrument for RES support because of the prevailing decentralisation (asymmetry) of information about relevant variables (i.e. LCOE), policy goals of volume control, efficiency, and more. International experiences with auctions show that auctions can lead to reductions in support levels (in terms of the contracted price, premium or discounts achieved) and thereby increase the efficiency of support. However, auctions are in general an instrument that focuses on short-term (static) rather than on long-term (dynamic) efficiency. Whether auctions help drive down costs of less mature technologies is not possible to thoroughly assess, because its measurement requires longer time spans than what is currently available for analysis in past experiences with auction.

Using auctions may lead to less overall RES deployment than other instruments (del Río and Linares 2014). It is a fundamental requirement for auctions that the tendered volume is less than the market potential in order to create sufficient competition. The inherent volume limitation may stand in contrast to the ‘at least’ nature of the RES target on European level: in practice, auctions may lead to treating RES targets as ‘maximum’ levels, even though this also depends on the way the auction volume is determined.

Our empirical analysis has shown that no one-size-fits-all auction scheme exists. The auction design must be adapted to the specific framework and market conditions of a country; otherwise, the competitive outcome could be endangered. Specific conditions include the level of competition, participation of multi-project bidders, transparency of bidders, uncertainty about project costs and energy yield for both bidders and auctioneer, default risks, and the periodicity and frequency of the auction. Therefore, **REDII must facilitate the flexibility that allows for adapting auction design to specific market conditions. Still, some learnings can be implemented as common principles.**

The use of auctions for renewable support is still in its beginnings. For many implementations, a comprehensive assessment is not possible yet, as realisation rates can only be measured years after the auction has taken place. In addition, many auction schemes are being changed over time, often between each auction undertaking. This implies that still a lot of learning is ongoing in policy making for RES auctions. **REDII should provide sufficient flexibility in the rules and requirements for Member States (MS) to allow for further institutional learning.**

The performance of auctions relies on adequate competition levels. It is of utmost importance to design auctions for the best competition possible, also avoiding strategic bidding. A preventive measure against implicit collusion is to occasionally change auction rules (like conducted by the European Central Bank in the refinancing operations auctions). This also demands sufficient ’room to manoeuvre’ regarding auction design for MS (Asubel et al., 2014).

Examples

(Static) efficiency gains from auctions

Support levels in California fell from €79.5 per MWh in the first auction round to €70.5 per MWh in the third one (averaged across technologies) (CPUC, 2014). In Brazil, 60 % price reductions compared to the former FIT (i.e. Proinfa) indicate a high level of competition in the auctions leading to important efficiency gains (Held et al., 2014). Similarly, prices in South Africa have gone down in successive rounds, from R3.27 (€19ct) per kWh in the first round to R0.77 (€4ct) per kWh in the fourth round. In Germany, the average price of the first auction round was €91.7 per MWh. Over the next rounds, the price progressively declined to €72.3 per MWh (Wigand et al., 2016).

Realisation rates

Case studies also showed that full project realisation is rarely achieved, and delays are frequent (Wigand et al., 2016). At least 75% of projects - whose realisation period has ended - in California and South Africa have been built. Some countries including Brazil, France, and Italy, initially faced problems with relatively low realisation rates. Auction schemes in China, Denmark, and Portugal have now commissioned 100% of contracted capacities, albeit not without delays in some cases. In the UK, Netherlands, and Italy targeted budgets or capacities were not fully allocated.

Importance of competition

In Denmark, efficiency gains were made in all rounds except in the Anholt tender, where only one bidder participated in the auction (Kitzing & Wendring, 2015). This, together with the supply bottlenecks experienced at the time in the region, led to high contracting prices (€141 per MWh).

2 Technology-neutral vs. technology-specific auctions

Technology-neutral support may lead to a higher static efficiency because RES technologies are in competition and those characterised by lowest generation costs are being utilised first. In a technology-specific auction, on the other hand, the contributions of individual technologies are administratively set based on individual auction volumes. This may lead to the exploitation of RES potentials that would not be utilised under technology-neutral auctions (e.g. for offshore wind) and thus lead to higher generation cost. The focus on lowest generation cost in technology-neutral auctions, however, abstracts from the fact that the total costs caused by individual technologies are not limited to generation costs but also involve costs for e.g. system integration and that technologies might contribute with secondary benefits such as diversity and security of supply. These additional costs and benefits are – to the extent they are not reflected in the market value as seen by investors – not considered in the selection process in purely technology-neutral auctions. Different RES technologies may lead to very different costs for system integration and grid expansion. Therefore, technologies with lower generation costs might still lead to higher overall system costs. Technology-specific auctions (or rules within auctions) are a means to steer development towards the lowest overall system costs.

Furthermore, it is not given that a cost minimisation in the static perspective of today's cost structure is desirable for overall welfare. The assessment from a dynamic system perspective must consider additional aspects: Technology learning might reduce the costs of currently more expensive technologies in the future so strongly that they can replace the currently cost-effective technology choices. Hence, the total generation costs of a technology portfolio for the full transition period (e.g. until 2050) need to be considered in order to minimise overall generation costs over the whole time period. While technology neutrality in principle could provide strong incentives for cost reductions (to catch up with the cost competitive technologies), markets typically fail to deliver these cost reductions in the presence of e.g. learning spill-overs. Without the expectation of a guaranteed market for the result of innovation activities (e.g. provided by technology-specific auction volumes), it is unlikely that sufficient innovation takes place for technologies that needs a high degree of innovation e.g. immature technologies.

It has also to be noted that technology-neutrality often leads to windfall profits for lower cost technologies in support schemes, which increases policy costs. The significance of this effect depends on the cost differences between the low and high cost technologies and is therefore very country specific. Windfall profits can be limited in technology-neutral auctions by setting technology-specific ceiling prices (like in the Netherlands). Nevertheless, low cost technologies will face limited competition and can bid up to their ceiling price, if the auction is cleared by a more expensive technology.

Additional aspects need to be considered for auctions as support instrument in particular: Different technologies often require very different auction design, e.g. offshore wind and PV. This concerns different pre-qualification requirements, different degree of regulatory involvement in the planning procedures, different penalty regimes, and more. Treating all technologies equally may substantially undermine the performance of auctions, as some technologies may have structural competitive advantages (e.g. because of faster permitting) and as it may lead to strategic bidding (e.g. when PV developers have long grace periods, they may start to speculate on falling module prices). In addition, if technology neutrality leads to a reduction of investor diversity, this may decrease the level of competition and liquidity of auctions on the long run and hence increase policy costs.

A trade-off exists between designing an auction technology specific and technology neutral. Whether the advantages or disadvantages of technology-neutrality prevail will depend on the level of technology costs, available market potential, technology differences in system integration costs and technology maturity. We find that some advantages and some disadvantages of technology neutrality reduce with decreasing cost differences of RES technologies. However, a number of design challenges remain. Thus, **REDII should still leave flexibility to MS to adequately design their auctions in a technology-specific manner**. MS wishing to introduce strong competition between technologies may want to opt for technology clusters instead of pure technology neutrality to avoid high windfall profits of the cheapest technologies. These technology clusters, however, must be carefully designed in order to avoid the problems that have occurred in practice.

Examples for empirical evidence with multi-technology auctions in the EU

Most of the countries using auctions to determine the support level for RES-technologies have implemented a technology-specific auction scheme in light of various policy goals (Wigand et al., 2016). However, Brazil applied technology-neutral auctions in parallel to technology-specific auctions, and California and the UK opted for multi-technology auctions by grouping either according to the generation profile of RES (California) or the maturity level (UK). The Netherlands introduced technology-neutral auctions with some technology specific criteria, e.g. the different maximum prices per technology.

Empirical evidence with technology-neutral auctions used in the 1990’s in the UK and Ireland has shown a limited ability of technology-neutral auctions to promote technologies with different maturity levels. The more expensive technologies were not promoted in the UK, where waste-to-energy and onshore wind dominated (Mitchell & Connor, 2004). No biomass-anaerobic digestion or offshore wind projects were commissioned in the Irish Alternative Energy Requirement (AER) programme. Experiences with the use of technology baskets from the recent UK auctions also indicate some problems. Firstly, the overall budget or available capacity still need to be distributed between pots. In the UK's most recent auction, for example, the budget reserved for 'less mature' technologies was three times the budget for mature technologies. Similar to technology-specific auctions, grouped auctions can still lead to static

3 Exemptions from auctions

3.1 Exemptions based on de minimis rules

De minimis rules can be defined on three grounds: type of actor, size of actor and size of projects. First, meeting renewable energy targets requires public acceptance and the access to all suitable sites for project development. In some MS, public acceptance is strongly related to the type of actors developing projects. Making sure that they can still develop projects is therefore of greater benefit for RES target achievement and would possibly justify exemptions based on the type of actor, e.g. investors that are local citizens. The definition of which actors to exempt from auctions is highly context specific and cannot be commonly defined. It should be required, however, to define actor-type de minimis rules in such a way that options for abuse can be avoided and competition within the auction is not undermined.

Second, auctions are particularly difficult for small actors as they have – by definition – a smaller portfolio. This reduces their possibility to mitigate the risk of not being successful in the auction. Consequentially small actors can be crowded out. Exemptions based on the size of actors could therefore be justified on the basis of non-discrimination. Preferential treatment for small actors within the auction could increase the liquidity of the auction through greater participation, competition and lead to a more efficient result. However, there is also a risk that larger actors will find creative strategies to define themselves as small actors and benefit from the preferential treatment.

Third, exemptions based on the size of projects may help to reduce transaction cost, which are relatively higher for smaller projects both for investors and for the administration, yet there is no direct correlation between the size of projects and the size or type of actors. The State Aid Guidelines refer to exemptions based on the size of projects, allowing administratively determined feed-in-premiums for projects below 1 MW except wind onshore (6 MW or 6 units). As for solar, the 1 MW de minimis rule exempts the residential sector and large parts of the commercial sector, which seems reasonable. As for onshore wind, a certain project size limit seems problematic, as there is no natural segmentation in the market. Any definition would be arbitrary and would cut off the market at the point of technological progress. De minimis rules based on the number of turbines (e.g. 6 turbines or less) risks that projects are artificially reduced in size. In addition, available locations may be reduced, leading to allocation inefficiencies. A more natural segmentation would be to exempt small wind turbines (according to IEC norm below 100kW).

Side issue: clear definitions are crucial
For onshore wind, the current State Aid Guidelines led to confusion on the possibly exempted project size. It is unclear whether the definition includes projects that comprise of 6 turbines of 6 MW (36 MW in total) or a 6 MW project size (e.g. 2 turbines of 3 MW).

In summary, **REDII should allow MS to define de minimis rules on any of the three grounds: the type of actor (to increase acceptance), the size of actor (protecting small actors from being most impacted) and the size of projects (to decrease transaction costs)**. Combinations (e.g. exemptions of small projects of certain type of actors) should also be allowed but it should be ensured that the volume within the auction remains sufficiently high in order to profit from the competitive allocation of RES potentials in an auction.

Examples for de minimis rules

Actor type rules
Germany uses an energy cooperative definition in which at least 51% of voting rights have to be held by at least 10 local natural citizens.

Actor size rules
The EU definition of small- and medium-sized enterprises (SME)

Project size thresholds for solar PV
France: 100kW, Germany: 750kW, the Netherlands: 15kW, Italy: 5MW, the UK 5MW

3.2 Exemptions for immature technologies, immature markets and demonstration projects

Immature technologies may have very few potential projects (and thus bidders), high risks and uncertain costs, limited commercial experience on the part of the developers and other characteristics, which make them eligible for exemption from an auctioning system. As Batlle et al. (2011) and Kitzing & Mitchell (2014) point out, quantity-based and competitive instruments such as auctions entail large market risks for private investors, and may therefore be less appropriate for triggering the necessary dynamic processes for sustainable growth, which is needed to lift technologies into market maturity. In case of demonstration phase projects, auctions are even less suitable, since there is often no competition possible because demonstration projects are *per se* 'one of a kind'. For these reasons, auctions appear to be less appropriate for creating a dynamic, multi-project market for immature technologies and demonstration projects. We recommend **REDII not to prescribe auctions for new/immature technologies and demonstration projects**. The choice of support instrument for immature technologies or immature markets should be left to MS, and exemptions for immature technologies or markets should be allowed under certain conditions. In particular, we do not recommend the use of auctions for demonstration project at all.

REDII could guide towards identifying which technologies are immature, by proposing a methodology to define 'immature' technologies and markets. This can include comparing the levelised cost of electricity

(LCOE) of the immature to those of more established technologies, and considering the market maturity of a technology in a certain country, e.g. expressed by a minimum market share of a technology.

Clear guidance on what constitutes a demonstration project can help reduce uncertainty for investors. Criteria for establishing whether a technology is in the demonstration phase may reflect the volume of existing installation in comparable geographical environments, the degree of divergence from mature energy technologies (requiring that innovations are substantial rather than incremental) and the proportion of the installation CAPEX which is deemed innovative (a proxy for the level of technology risk borne by the developer).

Side issue: clear definitions are crucial

The challenge is to define ‘immature’ technologies and demonstration projects. Besides the matureness of the technologies, country-specific characteristics such as the matureness of the markets should be taken into account.

Deciding what qualifies a technology as being at the 'demonstration' phase is likely to be highly context specific. A blanket qualification based on a technology being first of a kind (FOAK) in Europe is inappropriate. That a technology has been demonstrated in one geographical context does not immediately mean that it should participate in auctions in all other contexts. Some energy technologies, for example, may have been demonstrated in one marine environment such as the North Sea, building understanding that may be of limited applicability in another such as the Atlantic or Mediterranean. It could also be the case that although the core generation technology such as a wind turbine generator is proven, other elements such as the foundation of an offshore wind turbine is new. Enabling national and European policy-makers to encourage innovation by exempting some installation types from auctions is vital for long-term cost reduction.

Examples for non-suitability of auctions for immature technologies

The experience in the UK with the Non-Fossil Fuel Obligations (NFFO) has shown that applying auctions as support mechanism for immature technologies involves a high risk of non-realisation, as successful bidders may not be able to implement their projects if they underestimate their costs (winners curse) (Butler & Neuhoff, 2008). A comparison of the NFFO with the German feed-in tariff system in the same decade revealed that the NFFO not only resulted in lower deployment rates but also in lower price reductions – a finding that appears intuitively surprising. Although the tendering scheme resulted in a larger price competition among investors, it was unable to generate sufficient competition among turbine producers and constructors. As Butler & Neuhoff (2008) stress, these stages of the value chain, however, are most important for overall price reductions, especially for less established technologies.

3.3 Exemptions due to market conditions

The applicability of auctions should always be tested for each implementation and its specific framework and market conditions. If sub-optimal results can be expected from auctions, it may be preferable to revert to other instruments. REDII should give MS the opportunity for implementing alternative support instruments if a comprehensive impact assessment ex ante predicts poor performance of an auction and no mitigation options are reasonable.

Sub-optimal results from auctions may be expected because of:

- Low number of projects or sites (or number of bidders in a single-site auction)

- Collusive bidding / concentrated market expected
- Low market maturity / inexperienced bidders

If only a very low number of projects or sites are available, i.e. ready for bidding, then securing sufficient competition can be a problem. Often, this can be mitigated by design changes (e.g. smaller auction volume, lower pre-qualification requirements etc.), but sometimes no reasonable mitigation options exist. Then, alternatives to auctions should be pursued. The same issue exists with risk of collusive bidding, or concentrated markets.

In situations of low market maturity and inexperienced bidders, it may sometimes be preferable to revert to alternatives, especially in combination with a large development back-log and many projects in the pipeline. These conditions may lead to bids not reflecting the true costs, may it be because bidders are not capable of estimating them, have strategic interests or are desperate to winning. All these issues may be mitigated by design (e.g. using pay-as-bid instead of uniform pricing, introduce minimum or maximum prices, etc.).

The applicability of auctions in situations that have a risk of leading to sub-optimal results should be assessed on a case-by-case basis via impact assessments. The assessment should also include the analysis of mitigation options. REDII could require MS to explore the following mitigation options before dismissing auctions:

1. Improved auction design
2. Adapted national conditions
3. Initiated / intensified cross-border / regional cooperation with other MS

We recommend that **in the expectedly rare cases that a thorough impact assessment ex ante predicts poor performance of an auction scheme and no reasonable mitigation options exist, MS should be allowed to employ alternative support instruments** (such as administratively set tariffs or premiums) independent of the technology, installation size or type.

Examples for sub-optimal auction outcomes

Few eligible bidders

In France, one of the two auctions schemes for PV affects installations with a capacity between 100 and 250kW. Intended to target private small actors, however, all of the early auction rounds attracted only few eligible bidders. The resulting low competition further led to high support levels (support levels under the previous FIT were on average €2-3 Cent/kWh lower than those of the auction) (Förster, 2016).

Underbidding

In Spain, the first RES auction was conducted in January 2016 for onshore wind and biomass. It followed a multi-annual moratorium, which suspended support payments and resulted in a long pipeline of projects and heavy pressure for investors to win in the auction. Consequently, the investors bid very aggressively and the majority of bids were unreasonably low. Although it is too early to draw concrete insights from the auctions (projects do not have to be built before 2020), there are reasonable doubts whether it is possible to implement the projects under such low support levels (Del Rio, 2016).

4 Design of auctions

In this section, we elaborate on the design of auctions and suggest which design elements should be regulated by the REDII, harmonised or left to the decision of MS. We base our suggestions on experiences gained in the context of the AURES project, including considerations from economic theory and experiences from past auctions. We suggest that general design principles should be established in REDII to ensure stability for investors, limitation of support costs and target achievement, whilst decisions on other implementation details should be left to MS.

	Prescribe specific rules in REDII	Prescribe principles in REDII	Give options / guidance in REDII	Leave open to MS
Auction type		x		x
Auction schedule	x			
Auction volumes and limits			x	
Auction frequency				x
Maximum / ceiling price	x	x		
Pre-qualification and penalties	x			
Price as selection criterion	x			
Secondary objectives				x
Seller concentration rules			x	
Auction procedures	x	x		
Transferability of support licences				x

4.1 Auction type

Auctions for RES are usually multi-unit procurement auctions. Within this group there are many different types used. Depending on the particular market conditions, those different auction types may be appropriate. However, there are three general principles that every conducted auction should fulfil.

1. The submitted bids are binding.
2. The bidders with the best bids win.
3. The winning bidders receive at least their bid price.

There are different possibilities to define the best bid. In most cases the best bids just mean the bids with the lowest prices. Nevertheless, it is possible to include other criteria in the evaluation process. Possible criteria are for example actor diversity or a certain geographic distribution.

Three fundamental types of auctions (static, dynamic and hybrid) fulfil these criteria, and are all relevant and were already conducted as auctions for renewable energy. In general, all of those three types can be further segmented by their payment rule which is either discriminatory or has uniform prices. In the light of similar auction results regarding different auction types, **we suggest REDII not to prescribe the auction type for MS but to require the auction to fulfil the three criteria set out above.** This allows MS to choose the suitable auction type for their specific market situation and policy objectives.

4.2 Auction schedule and frequency

A long term auction schedule is highly relevant in order to ensure a framework of certainty for investors. This certainty not only avoids unnecessary investor risks but also unfavourable auction outcomes. Such outcomes may be (too) aggressive or even desperate bidding due to late project realisation phases and lacking visibility of future opportunities to receive support.

Examples for lacking auction schedules

The Spanish auction in January 2016 was a one-time-only auction and experienced very aggressive bidding that, together with a uniform pricing rule, resulted in zero support levels with arguably low expectations on realisation rates (Del Rio, 2016).

In the UK-CfD auction the absence of any confirmation of when the next auction round was going to take place may have played a role in the decision of one solar PV developer to submit a bid that was commercially unviable for a project that was ready to be built (Fitch-Roy & Woodman, 2016).

Therefore, **REDII should require MS to set up long term, forward-looking auction schedules**. The requirement may be relaxed in case of cross-border cooperation, where investors have access to different national or cross-national auction schedules.

In order to increase flexibility for the auctioning authority while accommodating the need for investor certainty we recommend a two-step approach. The first step is an auction roadmap with a time horizon of up to 10 years (but at least 3-5 years). This roadmap should provide security for investors and the overall power system and should at least contain the following: 1) scope and timing of auctions; 2) auction volumes; 3) adaptation process. From the roadmap, it should become clear which technologies and installation sizes will be auctioned at which frequencies. Volumes should be defined for each planned auction in the roadmap and at least at an annual level. Acknowledging that plans must be adjustable, e.g. to correct for low realisation rates or unclaimed support rights from previous auction rounds, a transparent adaptation process should be defined, establishing e.g. review periods, timing and procedures for volume and scope adjustment. We recommend that the auction roadmap should be updated and adapted for example every 2 years.

The second step is a more detailed description of the upcoming auctions and should be published at least every 2 years for the next 2 years. Depending on country and technology characteristics, the frequency of this more detailed planning can be adjusted (e.g. for offshore wind, where auctions are usually conducted less often, a more reasonable time frame may be 3-4 years). This forward-looking detailed schedule is important, as experiences with auctions so far have taught that only a sufficiently broad time plan allows investors to prepare well-conceived bids, leading to reasonable auction outcomes. Thus, the auction schedule must be the more detailed the closer the date of the auction is. The detailed auction schedule should not only feature the timing of each of the upcoming auctions but also details on the auction design as well as the auction procedures.

The optimal frequency of an auction depends very much on the technology to be auctioned and the market situation. It is always a challenge to balance increased risks for investors in case of a low frequency with higher transaction costs and fluctuations in the competition level in case of a high frequency. Countries with a small market or low target volumes and technologies with long lead times (such as offshore wind) need a lower auction frequency than bigger markets and technologies with short lead times (such as PV). Due to the specific needs with regards to technologies and market situation, **REDII should not prescribe any specific frequency of auctions.** Our recommendations regarding auction volumes and procedures are discussed in sections 4.3 and 4.4 below.

In addition, REDII should include a requirement to monitor the auction process and outcomes in order to facilitate institutional learning and policy improvement processes. Important aspects for such monitoring are, next to the price outcomes, e.g. realisation rates and competition levels. A part of the monitoring could also be to setting up early warning systems to identify delays in project realisation. Identifying delays at an early stage helps to constructively address the issue in a timely manner (Wigand et al., 2016).

In summary, **REDII should require MS to publish a long-term auction roadmap, more detailed auction plans for shorter time horizons and to set up appropriate monitoring systems.**

Examples for auction frequencies in selected countries

Less than once per year	Once per year	More than once per year
DK (offshore wind)	IT (multi-technology)	DE (solar, 3 times p.a.)
IRE (multi-technology)	NL (multi-technology)	FR (solar, 1-3 times p.a.)
	UK (multi-technology)	PT (onshore wind, biomass, 1-2 times p.a.)
		CAL (multi-technology (mostly solar), 1-2 times p.a.)
		BRA (multi-technology, 2 times p.a.)
		SA (hydro, biomass, landfill gas)

Source: Wigand et al (2016)

4.3 Auction volume and limits

The auction volume or cap can be set explicitly in form of electricity generation (MWh to be delivered) or capacity (MW to be installed), or implicitly as budget cap (mEUR of support budget claimable). Since the EU RES targets are set as percentage of electricity demand, generation-based volumes could be expected to work best in terms of predictable target achievement. Under budget-based auctions, the amount of generation will be most uncertain. Capacity caps are rather straightforward for bidders and auctioneers and make the assessment of effectiveness easy and quick (realisation rate can be measured as soon as capacity is installed). Capacity-based volumes also give the strongest signal to equipment manufacturers and developers about the relevant market size for the future, and may therefore lead to further cost reductions from innovation and supply chain improvements.

When choosing generation-based volume setting, the contract volumes should not be set too stringent for RES producers who are dependent on resource availability. Annual delivery periods are probably too stringent, e.g. for wind and its seasonal variations. Generation-based volume setting may also cause difficulties with changed market conditions for eligible technologies, e.g. if rules regarding priority dispatch or priority access are changed. This should be considered when contracting volumes and when defining penalty rules.

REDII should allow MS to choose between generation-based and capacity-based volume setting in auctions. Budget caps may also be chosen if politically desired, but represent a less preferred option due to the high complexity and the associated increased uncertainty for investors.

As mentioned in section 4.2, in order to increase the flexibility for the auctioning authority, we recommend that plans for e.g. the total budget should be established for a longer time horizon and then the volume of individual auctions can be adapted in regards to the progress of the individual auction rounds (rolling auction budget).

Examples for auction volume setting

Budget caps have so far been introduced in the Netherlands, Italy and the UK. Capacity caps are used in all other auction implementations in Europe and most auctions around the world as of today (Wigand et al., 2016).

In the planned auctions in Poland, volumes are contracted as averages over a three-year period, with penalties applying if delivery is less than 85% over the period (Kitzing & Wendring, 2016). This approach has generally been accepted as feasible by the local industry.

A design feature used in the Brazilian auctions are 'adjustable volumes', where a 'demand parameter' is introduced to force a minimum level of competition: if equal to 1.5, the auction's supply must be at least 50% higher than the total volume (Wigand et al., 2016).

4.4 Procedures and participation enhancing measures

Attracting the largest number of participants possible is an important success factor for auctions. In the AURES case studies, we have found that participation can be facilitated by a transparent and inclusive design and implementation process, together with the incorporation of feedback from developers into the final auction specifications (Wigand et al., 2016). Stakeholder dialogue meetings are a crucial aspect in this. In addition, auction material should be made public early in the process (as draft for consultation). Furthermore, a sufficiently lenient time plan is important for the success of an auction. This improves auction design and allows well-prepared bids. These processes can take up to several months.

REDII should require MS to set up appropriate processes and can give guidelines on what appropriate in different cases may mean. This can e.g. include:

1. Discuss tender specification draft with industry / conduct at least one stakeholder dialogue meeting before final tender material is published
2. Give at least 15-30 days consultation period for the draft specifications
3. Allow at least 60-90 days for bid preparation

In any case, the auction process should define reasonable project realisation periods, considering typical project development cycles and required project progress ("early" or "late" auction).

Realisation periods differ largely between different technologies. While e.g. the realisation of offshore wind projects may take up to several years, solar projects can often be realised within a few months. This aspect may cause issues in technology-neutral auctions if they allow for only one grace period independent of the technology. It can either increase the risk of delay (for technologies with long realisation periods) or allow investors to speculate on decreasing costs (for technologies with short realisation periods).

Examples for implemented realisation periods

	Less than 2 years	2-3 years	More than 3 years
Offshore wind	UK	BRA	DK, IT, NL
Solar PV	FR, UK, SA	DE, BRA	
Onshore Wind	UK, SA	IT, CHN	
Geothermal Energy	UK		IT
Hydro	UK		IT, BRA
Biomass	UK, SA		IT

Examples for participation enhancing measures

Barriers from auction design that decreased participation

The offshore wind auction Anholt in Denmark serves a perfect example for an auction with too little competition (only one bidder). The auction was characterised by a lack of possibilities for investors to discuss the auction conditions and entailed relatively strict penalties for delays as well as a tight time schedule (Kitzing & Wendring, 2015). Further, the material relevant for the auction was only published in Danish and investors also had the opportunity to participate in a concurrent yet financially more attractive auction in the UK. The lack of competition eventually resulted in a support level that was considerably larger compared to similar auctions for offshore wind in Denmark.

Adjustment of auction design that increased participation

The introduction of an open dialogue between investors and contracting authorities which included not only written consultation of the draft tender material (in English) but also several stakeholder information and discussion meetings, resulted in several adjustments of the auction design and improved the results for subsequent auctions.

4.5 Maximum or ceiling prices

By defining a maximum support level, ceiling prices offer a strong potential to control policy costs. They can also help to mitigating windfall profits in case of limited competition. All MS except France have already implemented ceiling prices in some form. However, setting the ceiling price appropriately remains challenging, especially in a multi-technology context. If there is little competition and the ceiling price significantly exceeds the cost of a particular technology, bidders may orient their bids towards the ceiling prices rather than their real costs, making the auction ineffective. If the ceiling price is set lower than the technology cost, the auction risks becoming unattractive for investors, leading to fewer bids and in the worst case to problems achieving renewable energy targets. Bidders may also perceive the introduction of a ceiling price as a signal that the auctioneer is anticipating low competition, causing them to exaggerate their bids. This issue may be overcome by a stipulation from the European Commission to mandate the setting of a ceiling price in all auctions. Since ceiling prices offer a strong potential to control policy costs and discretionary implementation may distort competition, we recommend that **REDII requires MS to set ceiling prices** that reflect market conditions and an assessment of the technology cost.

In technology-neutral or multiple-technology auctions, either a common ceiling price can be implemented for all technologies or ceiling prices can be differentiated according to different technology cost. Both options have advantages and disadvantages. A technology-neutral ceiling price creates e.g. an incentive for lower cost technologies to bid above their cost, close to the ceiling price. But also technology-specific ceiling prices can cause inefficiencies, especially when there are large cost deviations within technology groups. To date all MS (including the technology neutral Dutch SDE+ and the grouped British CfDs) have differentiated ceiling prices. We recommend that in multi-technology auctions **MS should be free to implement technology-specific ceiling prices** to account for cost asymmetries between technologies.

There are two main options for calculating ceiling prices, an approach based on an assessment of levelised cost of electricity (LCOE) and an approach based on opportunity costs. Compared to an opportunity cost approach, an LCOE-based approach provides a realistic production cost assessment and thereby increases the chance of RES target achievement while reducing the risk of windfall profits. **We therefore suggest that REDII prescribes the use of an LCOE-based approach for calculating ceiling prices.**

When applying the LCOE-based approach, the ceiling price should be calculated from the perspective of a typical investor. Consequentially, the methodology should take the broader regulatory framework and transaction costs into account (taxes and tax exemption, market risk premiums, financing conditions etc.). As auctions increase risks for investors (as compared to administratively set feed-in tariffs) the ceiling price should also account for this risk – otherwise the ceiling price may become too stringent and thereby impede competition.

A suggested ceiling price calculation is given below.

$$LCOE = \frac{\sum_{t=1}^{n} \frac{I_t + M_t + F_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}}$$

- LCOE = Levelised cost of electricity
- I_t = Investment in the year t
- M_t = Operations and maintenance expenditures in the year t
- F_t = Fuel expenditures in the year t
- E_t = Electricity generation in the year t
- r = Discount rate
- n = economic lifetime of the system

Adjustment of ceiling prices on a regular basis is likely to be required as LCOE of renewables develop. Within the auction, three procedures to adjust prices exist. First, an administrative authority could recalculate the LCOE and the ceiling price on a regular basis. Second, the ceiling prices could be indexed to economic indicators (such as steel prices etc.) and changed automatically or by discretion of the auctioning authority. Third, ceiling prices could be adjusted based on the auction outcomes of previous rounds. The first option involves regular transaction cost but is well established in many MS with feed-in tariffs, the second option requires higher transaction cost to set up the methodology and the third option requires some attention to avoid strategic bidding. There is no preferred option and the method of choice for updating ceiling prices should be left to MS.

4.6 Pre-qualification requirements and penalties

An important aspect of designing an auction is to implement adequate pre-qualification requirements and penalties. Both are necessary in order to ensure serious bids and to select realisable projects, especially when dealing with inexperienced bidders. There are three types of re-qualification criteria: Restrictions, material pre-qualification and financial pre-qualification: Restrictions reduce the potential auction participants to only certain classes of bidders, and is therefore likely to result in less competition and higher support levels. Material pre-qualifications are typically project specific and occur at a cost for the bidder, potentially resulting in more aggressive bidding behaviour. Financial pre-qualification requires bidders to present a financial guarantee. The financial pre-qualification is usually linked to penalties, as the guarantees can be retained in case the bidder does not live up to its contractual liabilities.

Pre-qualification and penalties are important to ensure project realisation after the auction and to prevent implementation delays. On the other hand, both pre-qualification requirements and penalties may also lead to low participation rates and thus to low competition in the auction if set up too strictly. Particularly, smaller or private actors may experience strict pre-qualification criteria as a barrier, e.g. high bid bonds require a high creditworthiness. Striking an appropriate balance between pre-qualification requirements and penalties is therefore of key importance, as well as adapting penalties to local circumstances. Implementing inadequately low pre-qualification and penalty levels may attract speculators.

Pre-qualification requirements have been set in all countries examined by the AURES project, but the requirements vary with respect to e.g. technical or geographical specifications, the developer's experience or the developer's financial competences. While early tenders often entailed no penalties, often leading to low realisation rates, MS have lately chosen a mix of strategies to discourage delays and non-realisation of projects, including the enforcement of bid bonds (see table in the Example box below), support reduction, and reductions in support duration in cases of delay.

Bid bonds are often connected to the penalty level, and can be retained by the auctioneer in case of project delay or non-compliance. This link is recommended in order to ensure that the penalty is actually paid in case it should be required. Bid bonds can be asked for in two stages, but the detailed design should be the decision of the MS. For example, a first bid bond is retained once a bidder wins the auction but then withdraws from signing a support agreement. A second bid bond can be retained in case an investor has signed an agreement but then fails to complete the project within a certain pre-specified time frame.

REDII should require MS to implement both pre-qualification requirements and penalties. However, since they have to be case specific in order to be effective, we recommend **leaving it open to each MS to decide on their specific design and levels.** EC should provide support for deciding on the type of pre-qualification/penalty e.g. by setting up guidelines or by providing best case examples.

It may be advisable to require pre-qualifications to be supported and justified by sufficient arguments in order to ensure transparency and to avoid an illegitimate exclusion of some bidders.

Examples

Bid bonds sizes applied in different auctions

Country	Technology focus	First bid bond	Second bid bond
Portugal	Wind and biomass	€10 per kW	€25 per kW
Germany	Solar PV	€4 per kW	€50 per kW
Spain	On shore wind and biomass	-	€20 per kW
Italy	Multi	5% of estimated investment costs	10% of estimated investment costs

Source: Rosenlund Soysal (2016)

Pre-qualifications and penalties in different countries

Denmark imposed no penalties in the first two auctions for single-site offshore wind, which led winners to renegotiate the support levels in the first auction and to cancel the contract after the second auction (Kitzing & Wendring, 2015). The introduction of penalties entailed an implementation of all projects since then, however, too stringent requirements and too high penalties in the subsequent Anholt tender severely hampered competition (only one bidder).

In the NFFO auction in United Kingdom, no penalties led to low overall realisation rate of 26% (Fitch-Roy & Woodman, 2016)

In France, unclear pre-qualification requirements resulted in only 60% eligible bids. Particularly, in-experienced bidders were excluded by the requirements. This reduced competition and led to support levels that were higher than

4.7 Selection criteria: Price and possible secondary objectives

When achieving a low price is the principal objective of auctions, then price should be a main selection criterion in RES auctions. Since market competition and increase in efficiency is a main objective for the European Commission in the introduction of auctions, **we recommend that REDII explicitly mentions price as a preferred selection criterion**. In addition, auction design should be kept as simple as possible. However, the auctioneer may pursue further objectives in an auction including a certain geographic distribution of power plants, the promotion of actor diversity, the development of the domestic industry and value chain, and system integration aspects. Although the inclusion of secondary objectives in auction design may reduce static efficiency, other benefits may be achieved. For instance, implementing regional quotas for wind or solar power can lead to a more beneficial spatial distribution of RES-power plants, thus facilitating a more cost-efficient system integration and reducing overall system cost. Another example are rules that promote small and local actors to enhance their participation options, so ensuring broader social acceptance of RES.

Secondary objectives can be addressed within auction design. When including a secondary objective in the auction design the basic options are i) to include it as a selection criterion, or ii) to include it in form of a material pre-qualification criterion. If the secondary objective is considered as a selection criterion in the auction, all projects can participate, but those that perform well in the requested criterion are rewarded with extra points and are thus more likely to win. We recommend to **leave it open to MS if they would like to consider further objectives within the auction design**, particularly if required for public acceptance and reducing overall system cost. However, **REDII should require MS to provide a detailed description and a**

reasoning of the rules regarding secondary objectives in order to provide a sufficient transparency level. In addition, the achievement of these secondary objectives should be measurable.

Examples for useful integration of secondary objectives in auction design

Promoting small actors

Germany currently considers preferential treatment for citizen cooperatives, by which a citizen cooperative is defined as being owned by at least 10 local natural persons with together 51% of voting rights, developing a maximum of one project per year. In France, bidders in the PV auctions must be the owner of the building and maintain the installation (Förster, 2016).

Training and development of workforce

The Danish offshore wind auctions pursue a participatory approach including an open dialogue with stakeholders on tender specifications and framework conditions. In addition, the single-item auction for an offshore wind farm Horns Rev 3 required bidders to show that a certain number of trainees will be involved in wind farm construction. Such type of measures has certainly contributed to high acceptance of a large part of the population supporting the further development of offshore wind in Denmark (Held et al., 2014).

Domestic industry

The UK CfD auction asks projects larger than 300 MW to submit a supply chain plan to show how their project would promote innovation, competition, and skills (Fitch-Roy & Woodman, 2016).

4.8 Seller concentration rules

Lack of competition is arguably one of the most detrimental barriers for well-functioning auctions. One factor behind this problem is the concentration of the whole budget in one successful bidder, which could possibly result in a higher bidding price than without such concentration. Options for implementing seller concentration rules in order to mitigate the risk of market power include setting a minimum number of bidders under which the auction will not be carried out, limiting the size of bids per bidder and limiting the number of rounds in which bidders can participate. In principle, none of the options is inherently superior to others. The choice may depend on the specific market situation and technology, and participation may indirectly be enhanced by other design elements as well (e.g. pre-qualification requirements). Therefore, **it should be left for MS to decide whether to apply any seller concentration rules or which type to opt for.**

Maximum size limits on bids (e.g. max. 10 MW per installation) can encourage the participation of smaller actors and help avoid market concentration, but limit economies of scale. The optimum level of the size limit depends highly on the auctioned volume, the average size of installations, and other market conditions. **REDII could mention maximum size limits on bids as best practice against market concentration**, without mentioning any specific levels.

Examples for seller concentration rules

EU countries

Portugal: successful bidders in one round could not participate in the next round

Germany: bidders are allowed to submit more than one bid, but no single bidder can be awarded more than 10 projects per auction

Poland: the planned auction will require a minimum number of three offers (bidders)

Non-EU countries

California: one seller could not contract for more than 50% of capacity or revenue cap in each auction (across all bids)

India: the total capacity of solar PV projects to be allocated to a company is limited to 50 MW and the number or the size of bids per bidder may be limited

Australia: no bidder could submit bids for capacity that totalled more than 20 MW, ensuring that more than one proposal would be successful

4.9 Transferability of support licenses

Auction results can be efficient without allowing auction participants to transfer acquired support licenses to other projects (Ausubel & Cramton, 1999) (from Haufe & Ehrhart, 2016). In practice, the right to transfer a licence may be a useful design element in case the auction takes place at an early stage of the project planning. Transferability reduces the penalty risk for investors and may increase the target fulfilment as non-realised projects can quickly be substituted. In summary, the pros and cons of transferability depend on the particular auction design and **it should be left to MS to decide if they would allow transfers of support rights or not**.

Example for experience with transferable support rights

Germany introduced the right to transfer the support licences within the investor's portfolio to a different location because of the outlined reasons. At the same time, strong opposition to the transferability of support licenses between bidders (i.e. a secondary market) by the industry could be observed as they feared unproductive speculation.

4.10 Remuneration type and design

Auctions can be combined with different remuneration options, in particular with feed-in tariffs (FIT), sliding premiums (or Contracts for Difference, CfD), fixed feed-in premium (FIP), or capacity-based payments (like investment grants).

The choice between e.g. fixed and sliding premiums can have a significant influence on the auction outcome, i.e. who wins the support rights. Generally spoken, a sliding premium (or Contract for Difference, CfD) favours the projects with access to best resources, whereas a fixed premium favours projects with the best market values. As for fixed premiums, bidders are exposed to market price uncertainty. Empirical evidence shows that in such cases bidders with the most 'positive outlook' and not necessarily technologies with the best actual market values win, increasing the risk of a winner's curse. FIT are usually deemed more advantageous for smaller investors with low risk bearing capacities. In addition, the bid price determination is easier since sophisticated market price forecasting models are less required. It has to be mentioned, though, that specific design choices within both fixed and sliding premium systems can significantly alter the risk characteristics for investors.

Requirements for market integration and balancing responsibility seem to be a natural complement to the market-based characteristics of auctions. When transferring related regulations from the state aid guidelines to REDII, two issues are important: 1) exemptions must be clearly defined (e.g. de minimis thresholds); and 2) definitions should be unambiguous.

There are pros and cons for either remuneration type and design, and it is not within the scope here to conclude on certain preferred options – this shall be left to a more general discussion on support scheme design as a whole.

5 Cross-border auctions

An obvious reason for cross-border auctions is that cost savings can be achieved, i.e. a specified output of electricity can be generated at lower costs by two or more MS than it could by each MS providing the output individually. Thus, low cost potentials can become accessible to MS other than the one hosting the favourable sites. In addition, economies of scale and of scope can be achieved if two or more MS jointly organise an auction. Another benefit of cross-border auctions might be the increased competition and reduction of implicit collusion, which can again lead to efficiency gains.

In practice, such efficiency arguments are of limited importance to MS. A lesson from the debate on cooperation mechanisms is that most MS are reluctant to pay support for RES installations in other countries, despite potential efficiency gains (Klessmann et al., 2014). A major reason for this reluctance is the (anticipated or actual) low public acceptance of such cross-border support. However, MS seem to increasingly recognise the benefits of regional market integration and cooperation. Some countries have started to cooperate on cross-border renewables support, at least for small support volumes. Auctions are a suitable instrument for such limited cross-border cooperation, as they imply strict volume control.

Different options for the partial opening of national support schemes are being explored, which imply different levels of cooperation and alignment: unilaterally or mutually opened national auctions as well as joint auctions. **REDII should provide a definition and description of the relevant options** to guide MS in the implementation of cross-border auctions.

We see that the general investment conditions significantly differ across MS. This applies for natural conditions such as resource availability etc., but also for general economic and policy-based conditions such as tax rates, fees, regulatory requirements and procedures, access to financing, and much more. It is impossible to create a complete level playing field across countries. There will always be differences between bidding conditions, which needs to be addressed outside the auction itself. If there are massive differences in regulatory and economic conditions, this may lead to distortions of auction results and thus create acceptance problems.

Because of lack of experience with cross-border cooperation on support schemes and prevailing substantial differences in market conditions, **it might be too early for REDII to generically require cross-border**

auctions at this point in time. Requirements to cooperate might backfire, lead MS to abandon their own cooperation initiatives, and decrease acceptance of these initiatives as a whole. We are thus in favour of a solution in which **REDII requires that MS should always investigate cross-border auctions as an option** (i.e. in relation to mitigating suboptimal market conditions, as described in section 3.3), **but where the actual implementation happens on a voluntary basis or based on sensible rules to gradually increase cross-border participation**.

In case REDII require opening, it is important to provide a predictable and reasonable limit on the degree of opening, e.g. defined as a percentage of the total auction volume per year. MS currently fear unpredictable future increases of the opening requirement. In addition, MS should be free to limit opening up of auctions to certain technologies and auction rounds. Not all auctions should be required to open, e.g. for single-site auctions, which are common for offshore wind, a partial opening is impractical. Any opening requirement should allow MS to flexibly decide about which auctions should be opened as long as the required opening is achieved on average. Some countries prefer to limit the opening to countries from which electricity is ‘physically imported’ or has a ‘physical effect’ on their own power system. As it is very complex to define and measure such physical effect, the opening may be practically limited to directly interconnected neighbours. In interviews by Klessmann et al. (2014), many MS identified physical import of electricity as an important element of cooperation, expecting that this would increase the benefits and acceptance of cross-border cooperation. It seems reasonable to allow for restricted cooperation with selected (neighbouring) MS in order to increase implementation practicability and acceptability of cross-border auctions at this point in time.

References

Asubel, L. M., Cramton, P., Pycia, M., Rostek, M., & Weretka, M. (2014): Demand Reduction and Inefficiency in Multi-Unit Auctions. The Review of Economic Studies.

Batlle, C., Pérez-Arriaga, I. J., & Zambrano-Barragán, P. (2012). Regulatory design for RES-E support mechanisms: Learning curves, market structure, and burden-sharing. Energy Policy, 41, 212-220.

Butler, L., & Neuhoff, K. (2008): Comparison of feed-in tariff, quota and auction mechanisms to support wind power development. Renewable energy, 33(8), 1854-1867.

CPUC (2014): Decision 14-11-042 Decision 14-11-042 November 20, 2014. Available from: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M143/K313/143313500.PDF

Del Río, P. (2016): Implementation of Auctions for Renewable Energy Support in Spain: a Case Study. http://www.auresproject.eu/sites/aures.eu/files/media/documents/wp7_-_case_study_report_spain_1.pdf

Del Río, P., & Linares, P. (2014): Back to the future? Rethinking auctions for renewable electricity support. Renewable and Sustainable Energy Reviews 2014; 35: 42-56.

Fitch-Roy, O., & Woodman, B. (2016): Auctions for Renewable Energy Support in the United Kingdom: Instruments and lessons learnt. http://www.auresproject.eu/sites/aures.eu/files/media/documents/pdf_uk_rev1.pdf

Förster, S., (2016): Small-scale PV Auctions in France: Instruments and lessons learnt. http://www.auresproject.eu/sites/aures.eu/files/media/countryreports/pdf2_france.pdf

Haufe, M.-C., & Ehrhart, K.-M. (2016): Assessment of Auction Types Suitable for RES-E. AURES project report. http://auresproject.eu/files/media/documents/d_3_1_assessment_of_auctions_final_mm.pdf

Held, A.; Ragwitz, M.; Gephart, M.; & de Visser, E. (2014): Design features of support schemes for renewable electricity. http://www.isi.fraunhofer.de/isi-wAssets/docs/x/de/publikationen/Task-2-Design-features-of-support-schemes_final.pdf.

Kitzing, L., & Wendring, P. (2016): Implementation of Auctions for Renewable Energy Support in Poland: a Case Study. Technical University of Denmark. AURES project report.

Kitzing, L., & Mitchell, C. (2014). Achieving energy transitions: Which RES policies are best applied when?. In Energy Transitions International Conference, Finland.

Klessmann, C., de Visser, E., Wigand, F., Gephart, M., Resch, G., & Busch, S. (2014): Cooperation between EU MS under the RES Directive. A report compiled within the European project “Cooperation between EU MS under the Renewable Energy Directive and interaction with support schemes”, available at: http://ec.europa.eu/energy/renewables/studies/doc/2014_design_features_of_support_schemes_tas k1.pdf

Mitchell, C., & Connor, P. (2994): Renewable energy policy in the UK 1990–2003. Energy Policy, 32, 1935-1947.

Rosenlund Soysal, E. (2016): Pre-qualifications and penalties, AURES policy memo, forthcoming.

Wigand, F., Förster, S., Amazo, A., & Tiedemann, S. (2016): Auctions for Renewable Support: Lessons Learnt from International Experiences. http://www.auresproject.eu/files/media/documents/aures_wp4_synthesis_report.pdf

AURES is a European coordination and support action on auction designs for renewable energy support (RES) in the EU MS.

The general objective of the project is to promote an effective use and efficient implementation of auctions for RES to improve the performance of electricity from renewable energy sources in Europe.

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