Policy memo 1: Secondary objectives in auctions

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Secondary objectives in auctions

Short 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 possible measures to ensure secondary objectives in an auction by assessing bids along criteria other than price. It is one in a series of four Policy Memos published by the AURES project:

Policy Memo 1: Secondary objectives in auctions

Policy Memo 2: Pre-qualifications and penalties

Policy Memo 3: The effect of award types on auction outcomes

Policy Memo 4: The effect of competition levels on auction outcomes

Policy Memo, October 2016

Non-price criteria in auctions

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1. Including secondary objectives in auctions

Auctions are an appropriate allocation mechanism to identify market prices. But apart from getting the lowest price, the auctioneer may pursue further objectives in an auction, which may include:

- a certain geographic distribution
- development of the domestic industry and value chain
- actor diversity or the promotion of certain actor types
- system integration
- certain technical characteristics of projects

A policy maker may choose to address secondary objectives within the auction design itself or outside of the auction design, for instance by implementing regulation pertaining to spatial planning, industrial policy, or electricity markets. This policy memo focuses on ways of addressing secondary objectives in the form of a design element within the auction. Measures outside the auction design are described where they are especially relevant, or where there is no satisfactory way to address a secondary objective within the auction. Table 1 lists possible measures, which will be analysed in more detail in Section 2**Fejl! Henvisningskilde ikke fundet.**.

When including a secondary objective directly in an auction design, the basic options are i) to include it as a non-price criterion in the auction itself, or ii) to include it in the selection process of eligible projects, for instance in the form of a material pre-qualification criterion, by introducing contingents, or by exempting certain groups of projects from auctions and offering them alternative support.

If the secondary objective is considered as a criterion in the auction itself, all projects can participate, but those which perform well in the requested criterion are rewarded with extra points and are thus more likely to win. Various scoring options exist for such multi-criteria auctions. Most commonly, each submitted bid is given scores for the price criterion and each non-price criterion on a pre-defined scale. With regard to weighting the scores, the most common method is the linear weighting method in which a weight is assigned to each criterion in advance (Ballesteros-Pérez et al., 2015). Weighted scores are then added up to define a bidder's overall score. However, more complex methods can be used for calculating overall scores, for instance applying the Analytic Hierarchy Process, multi-attribute analysis, or fuzzy sets (Ballesteros-Pérez et al., 2015).

Pre-qualification criteria are discussed in this Memo as measures to implement certain secondary objectives. However, pre-qualification criteria are also used to filter out weak bidders and to ensure a high realisation chance of winning projects. These aspects are discussed in Policy Memo 2: Pre-qualifications and penalties.

Table 1 – Possible measures to implement non-price criteria in an auction

Objective	Measure
Geographic distribution	Contingents for certain location types/regions
	Pre-qualification criterion for desired location types/regions

	Criterion in auction to favour desired location types/regions
	Reference yield model
Development of domestic industry	Pre-qualification criterion for minimum local content
	Criterion in auction to favour projects with high local content
Actor diversity	Reduced financial pre-qualification (penalty) for small actors
	Reduced material pre-qualifications (building permits, grid access,…)
	Differentiation of pricing rules for small and large actors
	Exemption of small actors from auction scheme ; remuneration by an administratively set FIP
	Exemption of small actors from auction scheme ; remuneration at winning price of a previous auction round.
	Contingents for small actors
	Boni for small actors
System integration	Remuneration award metric sensitive to electricity market prices
	Deep connection cost charging
Technical specifications	Separate auctions for separate technology classes
	Contingents for technologies with certain specifications
	Criterion in auction to favour desired technical specification
	Boni for desired technical specifications/ mali for undesired specifications

2. Assessment of measures

Geographic distribution

A policy maker may want to steer the geographical distribution of winning projects in an auction, for instance in order to avoid the creation of hot-spots, to coordinate RES deployment with the existing grid and with grid expansion plans, to reduce producer rents, or for political or social acceptability reasons. For this purpose, the policy maker may want to favour a certain distribution across areas (specific provinces or regions) or location types (farmland, fallow land, marginal strips of roads or railways, etc.).

Measures to influence the geographic distribution of winning projects are only relevant for multiple-item auctions. In single-item auctions, a specific site is pre-developed by the responsible public authority, and the location of the site is thus not part of the auction result. Table 2 describes each measure and its expected effect on the outcome of an auction.

Table 2 – Measures to steer geographic distribution

Contingents for favoured location types or regions	
Description of the measure	A minimum share of the target volume is reserved for projects situated in a certain region or location type which is favoured for the above-mentioned reasons but in which projects tend to have higher generation costs, making them less competitive on price alone. A variation on this measure is to instead define a maximum contingent for non-favoured locations.
Effects on auction outcome	Awarding projects with higher generation costs will reduce the static efficiency of the auction scheme and can be expected to increase support costs. Any contingent requires many of the same considerations from the policy maker as the whole auction did: Is there enough supply within the contingent to create competition, given the demand created by the contingent size? If there is more than one contingent (i.e. for several different location types), the sum of all contingents should be considerably smaller than the total auction volume, thus leaving enough free volume for installations who win solely based on price. Contingents usually require the definition of a separate maximum price. Uniform prices across contingents are not advisable due to the expected systematic differences in price. A discriminatory pricing rule should be applied instead.
Pre-qualification criterion for desired location types/regions	
Description of the measure	Projects can only participate in the auction if they are located in a specific region or a specific location type.
Effects on auction outcome	Conceptually, this measure entails that a separate auction is undertaken for the desired location type. Other auction rounds may or may not be undertaken for the other location types filtered out by the pre-qualification criterion – such as, for instance in the first rounds of the German PV auctions, introduced in 2015, in which installations on agricultural land were filtered out by a pre-qualification criterion. No separate auctions were held for installations on agricultural land because, although usually featuring lower generation costs, installations on this location type were at the time not politically desired by the policy maker. Filtering out lower-cost installations in this measure results in reduced static efficiency and higher support costs. Target volumes need to be reviewed and, if necessary, adapted to the lower supply expected due to filtering out part of the bidders.
Criterion in auction to favour desired location types or regions	

Description of the measure	Projects from all locations can participate, but those from the desired locations/regions receive extra points and therefore have a higher likelihood of winning.
Effects on auction outcome	This measure does not reduce supply, as bidders from non-favoured locations can still participate. Target volumes thus do not need to be adjusted. The generation costs, and therefore also the bidding prices of winners can be expected to increase.
Reference yield model	
Description of the measure	Projects from all locations can participate. No specific type of location is favoured. However, difference in resource yield are evened out by higher prices being paid to weak resource locations and lower prices to strong resource locations. All bidders bid a price which is adjusted to an average "reference location", which makes projects comparable. The actual price paid later to winning projects is determined by whether their actual yield is above or below the reference yield.
Effects on auction outcome	If a certain geographic distribution is the regulator's objective, this measure addresses it only indirectly and in a rather complex manner. Setting the parameters in a way that make good projects still slightly more competitive, but not too much so, is very difficult. A reference yield model is applied in Germany's current administratively set FIP scheme for onshore wind and was also discussed during the set-up of the auction design.

Development of the domestic industry, value chain and innovation clusters

Policy makers may have an interest in promoting the development of domestic industry, innovation capacity, industrial cluster creation, or to positively influence domestic labour markets. Note that clearly favouring domestically manufactured materials may not comply with laws and regulations which aim to ensure a fair competition between local and imported products. For instance, EU member states are obliged to follow EU internal market regulations which severely restrict their possibilities of subsidising or otherwise favouring their own industries over those of other member states. Openly requiring a minimum local content, for instance, is therefore not an option for RES auctions within the EU.

A number of options exist to influence domestic industry development and labour markets through targeted measures outside of auctions, for instance through the creation of innovation clusters and through training programmes. An analysis of these is not undertaken here. However, targeted measures outside of auctions may in many cases be more cost-efficient and thus it may be preferable to including them in auctions.

Table 3 – Measures to influence the development of domestic industry and value chain

Pre-qualification criterion for minimum local content or labour force structure	
Description of the measure	Only those bidders may participate in the auction who can demonstrate a certain local content or a desired labour force structure.
Effects on auction outcome	This measure makes projects with high local content / a certain labour force structure more competitive. It may deter some bidders, for instance foreign ones, from participating in the auction, thus potentially limiting competition. The need for a downward adjustment of the target volume thus needs to be investigated. Generation costs may increase, for instance if bidders compete for locally manufactured components, thus driving up their prices. These effects are expected to be especially pronounced in small markets and/or the implementation of very large projects. Examples from real-life applications include the Danish single-item auction for an offshore wind farm Horns Rev 3, in which bidders had to show that a certain number of trainees will be involved in wind farm construction; the South African REIPPPP auctions in which projects have to demonstrate a minimum ownership share by black citizens and local communities as well as effects on job creation and enterprise development (del Río, 2016); and the UK CfD auctions in which projects larger than 300 MW have to submit a supply chain plan to show how their project would promote innovation, competition, and skills (Fitch-Roy and Woodman, 2016). In the Brazilian onshore wind auctions, a local content pre-qualification criterion was not part of the auction itself, but was necessary for project developers to obtain a subsidised loan under the FINAME programme, without which bidders were not likely to be competitive in the auctions (Förster and Amazo, 2016).
Criterion in auction to favour projects with high local content or desired labour force structure	
Description of the measure	The auction is held as a multi-criteria auction in which a high local content or a desired labour force structure increases the overall score of a bidder.

Effects on auction outcome	The effects with regard to bidder competitiveness and generation costs are the same as described above for pre-qualifications. Applied examples include the Chinese onshore wind concession auctions, in which bidders were required to prove local content which together with other non-price criteria accounted for up to 75% of bidders' scores. The measure lead to the development of a local supply chain, as the domestic market in China was big enough to account for some competition among domestic component manufacturers (Steinhilber, 2016). In the Portuguese wind auctions of 2006-2008, a non-price criterion including the development of industrial clusters, the technical management of a project, and promotion of innovation accounted for 20% of a bidder's score (del Río, 2016).

Actor diversity

Policy makers can have an interest in favouring a certain mix of actor types, for instance one with a minimum share of small or local actors. Such considerations are often connected to public acceptability concerns, as small and local actors are expected to be more rooted in the communities affected by renewables installations, thus making them more acceptable to the public. A regulator can also have an interest in keeping actors diverse in order to ensure high competition in the market in the long run.

The following measures focus on the promotion of small actors, as this is the most common group to be targeted by such measures. However, most of the measures can also be applied to other desired actor types. No matter which actor type is selected to receive preferential treatment, there will be an incentive for all actors to fall into the favoured category, in some cases adapting the legal form or shareholder structure of the project-owning entity accordingly. A careful legal definition of the favoured actor category is thus crucial to prevent non-eligible actors from slipping in.

Small actors can be faced with two problems:

- they can have systematically higher generation costs than large actors, due to their lacking economies of scale. However, this is not necessarily true for all technologies in all markets and thus needs to be explored by each policy maker in detail;
- they are not able to spread their risks as well as large actors due to their typically smaller project portfolio. This constraint applies to varying degrees for varying technologies and is especially true for technologies in which larger projects are the norm. Small actors with the capacity to develop only one or very few projects may be deterred from this by the risk of their project not being awarded in the auction, leaving them unable to spread their sunk costs over a large portfolio.

The following actor definitions and measures address either both or one of these problems.

Table 4 summarises possible methods of defining small actors. While the definition can be based directly on actor characteristics, it can also be based on project characteristics, with the implicit assumption that small projects tend to be carried out by small actors.

Table 4 – Methods of defining small actors. Source: Actor definitions are adapted from Tiedemann et al. (2015) who provided a similar assessment to the German Federal Ministry for Economic Affairs and Energy.

Definition by actor characteristics	
Description	The bidder developing the project is classified as a small actor by criteria such as their shareholder structure, frequency of developing projects, or whether they fall into the SME category according to the European Commission recommendation (L124/36). 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 (BMWi, 2016). Another example is France, where bidders in the PV auctions must be the owner of the building and maintain the installation (Förster, 2016).
Assessment	For the SME definition to be applicable, interconnections between the entity holding project ownership and possible larger mother companies must be identifiable to the regulator. There is also a danger of large players transferring ownership of a RES project to SMEs just before the auction with the specific purpose of receiving special treatment. Such strategic behaviour must be prevented, for instance by requiring the entity that holds project ownership to be classified as an SME at least from the auction to project realisation. Conflicts with EU laws and regulations are possible, as in the case of generation-based support, state aid regulation refers to exceptions for small installations rather than small actors. In addition, favouring “local” persons may also be problematic from a legal view.
Definition by project size (de-minimis threshold)	
Description	The current state aid regulation already foresees a de-minimis threshold, allowing RES installations of less than 1 MW, or less than 6 MW/less than 6 generation units in the case of wind, to receive support without going through a competitive bidding process (European Commission, 2014, Art. 42).
Assessment	This definition assumes that a correlation exists between small installations and small actors. At least for wind projects in Germany, such a correlation could not be confirmed (Grashof, 2015). A definition by project size is thus not suitable to achieve the aim of favouring small actors. For other technologies or markets, the degree of correlation would need to be explored before putting in place a de-minimis definition. However, de-minimis

	rules might be adequate measures for pursuing other policy goals such as limiting transaction costs of the auction etc.
Definition by potential frequency of auction participation	
Description	In any given year, an actor may potentially participate in auctions with all those projects which have obtained the necessary material pre-qualifications (i.e. building permits etc.). Large actors will usually have more such projects in their portfolio per year than small actors.
Assessment	The frequency of participation correlates strongly with the actor's risk of being awarded, which is especially high for small actors with just one or very few projects. The criterion is thus well suited to identify the group that should be favoured. However, the criterion is also prone to misuse, as large mother companies will have an incentive to hide their affiliation with small project companies in order to ensure favourable treatment for them. To address this, small actors could for instance be asked to register with the regulator and be subjected to random examinations to ensure their eligibility for small actor status. However, such a process requires time and resources. Furthermore, this definition could potentially result in a reduced number of offered projects, thus reduced competition, as companies can speculate on the benefits of reducing their participation frequency.
Definition for single projects	
Description	Similar to the definition by auction frequency, it is also possible to allow a small actor to get favourable treatment for one single project. Such a definition would benefit citizen cooperatives which exist just to realise one specific project in their area.
Assessment	The number of actors covered by this definition is expected to be small. Many small actors have more than one project and would not benefit from beneficial treatment. Small multi-project actors would have to enter full competition with their second project, which would only delay but not remove the barriers they face.

Once the favoured actor group is clearly defined, the policy maker must decide which measures shall be applied to provide better outcomes for this group, as shown in Table 5.

Table 5 – Measures to steer actor diversity. Source: Measures and their effects are adapted from Tiedemann et al. (2015) who provided a similar assessment to the German Federal Ministry for Economic Affairs and Energy; and on Kitzing et al. (2016).

Reduced financial pre-qualification (penalty) for small actors	
Description of the measure	Financial pre-qualifications deposited by auction participants usually serve as penalties, as they are not paid back to winning bidders who do not realise their projects in time. Such pre-qualification requirements can be reduced for small actors. For this purpose, financial pre-qualifications may either be split up in two steps, by which a small actor deposits only a small amount at first and the full amount only upon winning; requiring no pre-qualification at all without penalising them for non-realisation or delay; or requiring no pre-qualification and applying alternative penalties (reduction of support amount or duration) to prevent delay.
Effects on auction outcome	The measure will strengthen the position of small actors versus the banks from whom they need to obtain financing. With lower costs of capital, small actors are able to bid more competitive prices in the auction. All varieties of the measure can be expected to negatively affect realisation rates and thus the effectiveness of the auction. This is especially true for the approach with no penalties, which for this reason is not recommended. While the two-stepped approach and the alternative penalty approach are also likely to decrease the rate of on-time realisation, they will do this to a lesser extent that may be justified by the benefits of increased actor diversity.
Reduced material pre-qualifications	
Description of the measure	Small actors may enter the auction with reduced material pre-qualifications such as complete building permits or grid access guarantees at their chosen sites.
Effects on auction outcome	The measure reduces risks for small actors as they can participate in the auction earlier in their project planning process, thus obtaining certainty about whether their project will or will not receive support before having undertaken costly studies to receive permits. However, if the small actors are allowed to place their bids at an early stage of project development, this may lead to them misjudging their actual costs or resource quality, thus resulting in the winner's curse. Rational small actors would react to this by adding a risk premium to their bid price, which again would make them less competitive in the auction. The measure would require an adaptation of realisation deadlines for small actors. It may also have negative effects on realisation rates, if small bidders

	misjudge their actual costs. On the other hand, citizen cooperatives can have a high probability of project realisation due to high local involvement, thus balancing out this effect.
Differentiation of pricing rules for small and large actors	
Description of the measure	Small and large actors participate in the same auction. While the uniform-price (lowest rejected bid) rule is applied to small actors, the pay-as-bid pricing rule applies to all others. This measure is based on the assumption that small actors are more risk-averse and have access to less market information to judge competition levels.
Effects on auction outcome	Under a pay-as-bid rule, risk-averse small actors would place lower bids, possible below cost. Under a uniform price with lowest rejected bid, rational small actors have an incentive to place bids at their true cost. However, past examples show that inexperienced bidders often act irrationally by bidding too low under a uniform price rule, which can reduce realisation rates. The risk of not being awarded is reduced but still remains for small actors, thus potentially still deterring them from participation in the auction.
Contingents for small actors	
Description of the measure	A minimum share of the auction target volume is reserved for small actors, even if other actors' prices are lower.
Effects on auction outcome	This measure increases the probability of winning for small actors, as those small actor projects with the lowest bids will be awarded at least until the contingent is full. If small actor projects routinely place higher bids than other projects, this will result in higher support expenditures. The contingent must be small enough to still ensure sufficient competition among small actors. It is likely that separate maximum prices would be necessary for projects in- and outside of the contingent. Especially if large price differences are expected between small-actor projects and other winning projects, contingents are not suitable be combined with a uniform-pricing rule, as this would generate unnecessarily high producer rents. This measure is advisable if small actors face systematically higher costs than other actors, which is not necessarily true for all markets or technologies. However, small actors still face some risk of not being awarded despite incurring sunk costs for project pre-development, which may deter them from participating in the auction at all.

	Any contingent requires many of the same considerations from the policy maker as the whole auction did: Is there enough supply within the contingent to create competition, given the demand created by the contingent size? If there is more than one contingent (i.e. for several different actor types), the sum of all contingents should be considerably smaller than the total auction volume, thus leaving enough free volume for installations who win solely based on price.
Boni for small actors	
Description of the measure	Winning small actors receive a bonus on top of the price resulting from the auction. An administrative component is thus added to the competitive price finding mechanism.
Effects on auction outcome	This measure would increase the probability of winning for small actors. It results in higher prices being paid to small actors, thus increasing support expenditures. Setting an appropriate amount for the bonus is difficult, will likely have to be adapted over time, and may thus become the subject of regular political controversy. This measure is advisable if small actors face systematically higher costs than other actors, which is not necessarily true for all markets or technologies. However, small actors still face an award risk and may thus be deterred by the sunk costs for project pre-development.
Size limits on bids	
Description of the measure	The total size of bids per seller is limited, e.g. to x MW.
Effects on auction outcome	This measure is primarily targeted at avoiding seller concentration, but may in some cases be favourable for small actors. If there is a correlation between actor size and project size (which is not always the case, as mentioned above), limiting the size of projects would also limit economies of scale for large actors, thus making the smaller actors' smaller projects more competitive. The effect of this measure on small actors is rather indirect and is therefore not recommended as the primary measure to support small actors. However, if a policy maker wants to limit seller concentration at the same time, this measure can be useful.
Exemption of small actors from auction scheme ; remuneration at administratively set support level	

Description of the measure	Small actors are not required to participate in auctions. Instead, they receive support under a feed-in premium scheme with an administratively set support level.
Effects on auction outcome	This measure is suitable to address the risk of small actors of not being awarded. It also gives small actors good information on what level of support they can expect, thus reducing uncertainty. The measure can also be used to support small actors with structurally higher generation costs than large actors, as support levels can be adjusted by the regulator. The regulator will partly lose volume control by exempting actors from the auction. The number of actors covered by this exemption should thus be kept small. Auction target volumes may have to be adjusted downwards to compensate for the deployment outside of auctions. If administratively set support levels are higher than auction results, this will drive up total support costs. The legal feasibility of this measure considering current state aid regulation requires closer analysis.
Exemption of small actors from auction scheme; remuneration at winning price of a previous auction round(s).	
Description of the measure	Small actors are not required to participate in auctions. Instead, they receive support under a FIP scheme. The support level is determined by the result (highest accepted bid) of a previous auction for the same technology in which large actors are required to participate. Where available, the weighted average result of several past auction rounds is used.
Effects on auction outcome	This measure is suitable to address the risk of small actors of not being awarded. It also gives small actors good information on what level of support they can expect, thus reducing uncertainty. On the other hand, this measure is not suitable to support small actors who have structurally higher generation costs than large actors, as the winning price is determined by the large actors' marginal bid. The regulator will partly lose volume control by exempting actors from the auction. The number of actors covered by this exemption should thus be kept small. Auction target volumes may have to be adjusted downwards to compensate for the deployment outside of auctions. However, depending on how much the target volume is reduced, higher competition in the auction may lead to lower prices, which may in turn be unfeasible for small actors, thus limiting realisation rates outside the auction.

Partial reimbursement of project development costs for unsuccessful bidders	
Description of the measure	Unsuccessful actors are partly reimbursed for project development costs after a project has repeatedly been entered in auctions without winning.
Effects on auction outcome	The measure reduces the risk of small actors of not recovering their sunk cost in case of an unsuccessful bid, thus making auctions more attractive to them. However, setting the reimbursement amount is extremely difficult. If set too low, the measure has no effect. If set too high, this will reduce the incentive to develop excellent projects with good chances of winning. The measure is also prone to abuse, as actors might buy up bad projects and enter them in the auction just to receive the reimbursement. This measure is therefore not recommended.
Advisory services and bid quality control for small bidders	
Description of the measure	Small actors receive advice on bidding strategies and effects of auctions on their business model. The quality of bids (correctness and completeness) is checked before the bid is officially submitted.
Effects on auction outcome	The measure reduces uncertainties and thus increases acceptance of the auctioning mechanism among small bidders. It therefore addresses the problem of small bidders being deterred from auctions due to their complexity. It does not address the problem of small bidders having structurally higher generation costs. The measure causes higher transaction costs to the auctioneer, who needs to finance the advisory service. This measure is in addition to providing well-structured and easily accessible auction information to all bidders, which should be done in any case.

System integration

Renewables, especially variable renewable technologies, cause integration costs. These include balancing costs due to deviations from day-ahead production forecasts, grid-related costs due to the location of renewables plants being resource- rather than load-related, and profile costs caused by the tendency of variable renewables to generate at the same time, thus reducing the market value of their electricity (Hirth et al., 2015). At increasing shares of renewable electricity, policy makers have a growing interest ensuring a low-cost integration of renewables into their energy system. System integration may be ensured by steering the geographical distribution of renewables installations, the timing of their generation, or by subjecting them to forecasting and balancing requirements. Typical measures applied to other parts of the electricity system

include requiring conventional plants to generate more flexibly, coupling electricity and heat markets, and introducing demand side response mechanisms.

This policy memo makes no attempt at evaluating which of these measures are most effective in reducing integration costs. Nonetheless, Table 6 describes measures to promote system integration as part of a renewables auction design and assesses their possible effects on the auction outcome.

Table 6 – Measures to promote system integration

Remuneration award metric sensitive to electricity market prices	
Description of the measure	Remuneration is paid in the form of a FIP (fixed or sliding) or investment grant based on a reference electricity price (see also Policy Memo 3), thus incentivising producers to design their plants to have low correlation with other plants' generation profiles. Under current state aid regulation, generation-based support is required to be paid in the form of a FIP in EU Member States.
Effects on auction outcome	Fixed FIPs and investment grants require bidders to predict future electricity price developments over the lifetime of their plant. Bidders will incorporate this risk in their calculations in the form of a risk premium. It is likely that the bidders with the most optimistic price predictions will win the auction, thus increasing the risk of Winner's Curse. In addition, in the case of investment grants, project developers may be incentivised to implement plant designs which are undesirable from a system perspective (e.g. regarding rotor-generator-ratios in wind power plants). Sliding FIPs require a lower degree of electricity price predictions by bidders and therefore do not increase the risk of Winner's Curse.
Deep connection cost charging	
Description of the measure	Bidders are required to bear the full cost of connecting their planned installation to the grid (deep charging approach).
Effects on auction outcome	Bidders will incorporate the cost of connection into their bid prices, thus increasing support costs. System costs, on the other hand, are likely to be lowered as developers will take into account connection costs when choosing their sites (in case of multiple-item auctions). However, this measure puts an unduly high burden on RES installations for grid development measures from which other actors will also benefit, and which should thus be commonly financed. Furthermore, it may prevent participation from smaller companies,

	who do not have sufficient expertise in grid development. This measure is therefore not recommended.

Technical specifications

Policy makers may have an interest in promoting certain technical specifications in an auction, be it technology-specific or technology-neutral. Examples might include efficient CHP technology in a biomass auction, innovative technologies such as thin-film in a PV auction, certain environmental standards in a hydro power auction, or technical prerequisites for system integration.

Conceptually, treating certain technical specifications separately is no different from differentiating between RES technologies (such as onshore wind, hydro, PV, etc.). Similar pros and cons apply as for technology-neutral vs. –specific support scheme designs: Providing favourable treatment for a certain technological design is a political decision, as the favoured technology is protected from free competition with other, potentially lower-cost options. This may lead to higher support costs in the short term. On the other hand, the dynamic efficiency of the support scheme can be increased by favouring higher-cost but promising technology segments. Insufficient competition within each individual segment is a risk, especially for smaller and more specialised technology segments.

For our purpose, we assume that the technical specifications in question lead to higher generation costs, are thus less competitive, and therefore need to be supported by special measures.

Table 7 – Measures to promote desired technical specifications

Separate auctions for installations with certain specifications	
Description of the measure	Support for the favoured installations type is allocated in a separate auction, in which only installations of this type participate. The principle is thus the same as for auctions limited to a certain technology, for instance PV or hydro.
Effects on auction outcome	Requiring compliance with a certain technical specification may increase generation costs and thus lower static efficiency. Higher generation costs can be expected to be reflected in higher prices in the auction. At the same time, the technical requirement will eliminate some bidders from the auction. The regulator must take precautions to ensure that the resulting lower competition does not result in excessive support costs, for instance by adjusting the target volume downwards in accordance with expected supply.
Contingents for technologies with certain specifications	
Description of the	A minimum contingent is defined for installations complying with a certain

measure	technical specification.
Effects on auction outcome	Requiring compliance with a certain technical specification may increase generation costs and thus lower static efficiency. Higher generation costs can be expected to be reflected in higher prices offered within the contingent than outside of it. Any contingent requires many of the same considerations from the policy maker as the whole auction did: Is there enough supply within the contingent to create competition, given the demand created by the contingent size? If there is more than one contingent (i.e. for several different technical specifications), the sum of all contingents should be considerably smaller than the total auction volume, thus leaving enough free volume for installations who win solely based on price. A discriminatory pricing rule should be applied, as uniform prices across contingents are not advisable due to the expected systematic differences in price.
Criterion in auction to favour desired technical specification	
Description of the measure	The auction is held as a multi-criteria auction in which compliance with the desired technical specification increases the overall score of a bidder.
Effects on auction outcome	Requiring compliance with a certain technical specification may increase generation costs and thus lower static efficiency. Higher generation costs can be expected to be reflected in higher prices in the auction. An example are the French PV auctions, in which the installations' CO_2 footprints are included as a criterion. Starting from 2013, this criterion can contribute 33% of the total score (Förster, 2016).
Boni for desired technical specifications	
Description of the measure	Bidders submit a price offer and receive a bonus if they also comply with the technical specification. Alternatively, bidders may also receive mali in case their project displays undesired specifications.
Effects on auction outcome	This measure increases the competitiveness of bidders who comply with the desired specification. Effectively, this measure leads to the same result as the previous measure, where the specification is considered in an extra criterion within the auction.

3. Conclusions

A variety of measures are available to implement secondary objectives in auctions. All secondary objectives can also be targeted by measures outside of the auction design. The objective of enhancing the development of the domestic industry and value chain is in most cases better addressed by such outside measures. For the other secondary objectives discussed here, suitable auction design elements exist. All secondary objectives carry a potential trade-off with efficiency and effectiveness.

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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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