Report D7.1-SK, February 2016

Implementation of Auctions for Renewable Energy Support in Slovakia: A case study

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 the planned implementation of auctions for Renewable Energy support in Slovakia from 2016 on. The report will put a focus on the implementation process and will provide the necessary background information. Furthermore the planned auction design will be described and discussed both from a policy maker's and an investor's point of view. Finally main strengths and weaknesses will be identified and related to the analysis of past auction implementations from AURES work package 4.

The report contributes to the first of three tasks in work package 7 of the AURES project:

T7.1 Identifying future implementation plans for auctions in Europe

T7.2 Performing specific implementation cases of future auction implementation

T7.3 Model based analysis of the specific cases

Report D7.1-SK, February 2016

Implementation of Auctions for Renewable Energy Support in Slovakia: a Case Study

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Project deliverable:
WP7 – Future implementation possibilities for auctions in Europe.
Task 7.1 specific implementation cases

AURES; a coordination and support action of the EU Horizon 2020 program, grant number 646172.

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1 Introduction

As of early 2016, Slovakia has no concrete drafts for a future RES auction design. National elections will be held on March 5th, 2016. After the elections, decisions will be taken with regard to the future of the RES support scheme in general. The continuation of support for large-scale RES-E plants will be under discussion. If a decision is taken in favour of continued support for large-scale RES-E, an auction scheme will be a likely means of support allocation to projects, according to the Ministry of Economy of the Slovak Republic.

For this case study, this means that in contrast to the other AURES country case studies, we do not describe and evaluate a specific auction design which is currently discussed by the relevant policy makers. Instead, we suggest and evaluate possibilities for auction designs, based on the framework conditions found in Slovakia. In order to design an auction, some policy decisions such as for instance the desired deployment volume, must be taken in advance. For Slovakia, we partly relied on assumptions, as several relevant policy decisions were still open at the time of writing. Assumptions are explained and marked as such.

2 Description of market conditions and RES auction status

Country characteristics

The Slovak Republic has been a Member State of the EU since 2004 and has a population of roughly 5.5 million (CIA, 2015). It is part of the Visegrád Group[1], which under the initiative of Poland has been reluctant to agree to ambitious European climate and energy policies in recent years (Steinhilber, 2016). Nevertheless, the Slovak Ministry of Economy states the development of renewable energy as one means to improve energy security, along with nuclear energy and the diversification of sources for fossil energy (Ministry of Economy of the Slovak Republic, 2014, p.22)

Final energy consumption was 69 GJ per capita in 2012 and thus significantly lower than the average EU per capita consumption of 91 GJ (Ministry of Economy of the Slovak Republic, 2014).

[1] The Visegrád group is an alliance between Poland, Hungary, the Czech Republic, and Slovakia, so named due to its being founded at a summit meeting in Visegrád, Hungary. The purpose of the group is mutual support in furthering European integration as well as energy, economic, and military cooperation.

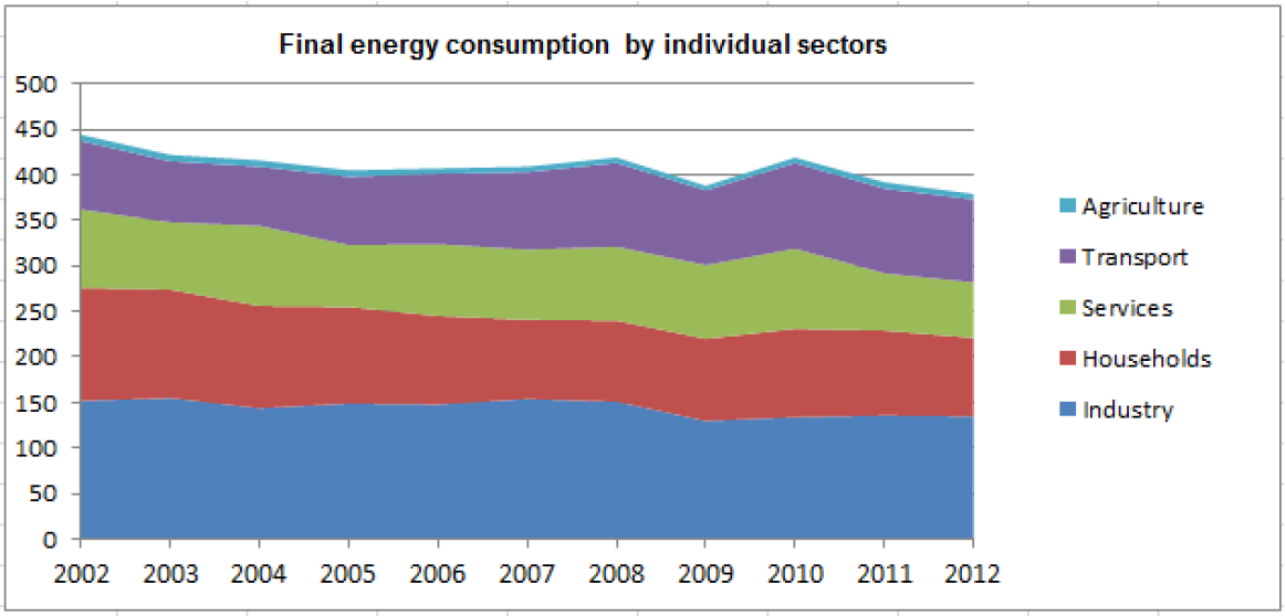

Figure 1: Final energy consumption [PJ] by sector. Source: Ministry of Economy of the Slovak Republic, 2014, p.16

Electricity market characteristics

The Slovak electricity market, together with those of the other Visegrád members Poland, Hungary, and the Czech Republic, forms the CENTREL area (Enel, n.d.). Generation and wholesale activities in Slovakia have been fully liberalised since 2005. Slovenské elektrárne has a 82% share of the country's generation market and is the main electricity supplier to the three big regional distribution companies ZSE (in western Slovakia), SSE (Stredoslovenská energetika in central Slovakia), and VSE (Východoslovenská energetika, in eastern Slovakia). The three distribution companies are 51% state owned, with the rest owned by private national and international investors (Enel, n.d.).

With regard to suppliers, next to the traditional actors ZSE, SSE, and VSE, consumers can choose between another 152 electricity suppliers in the market (URSO, 2013).

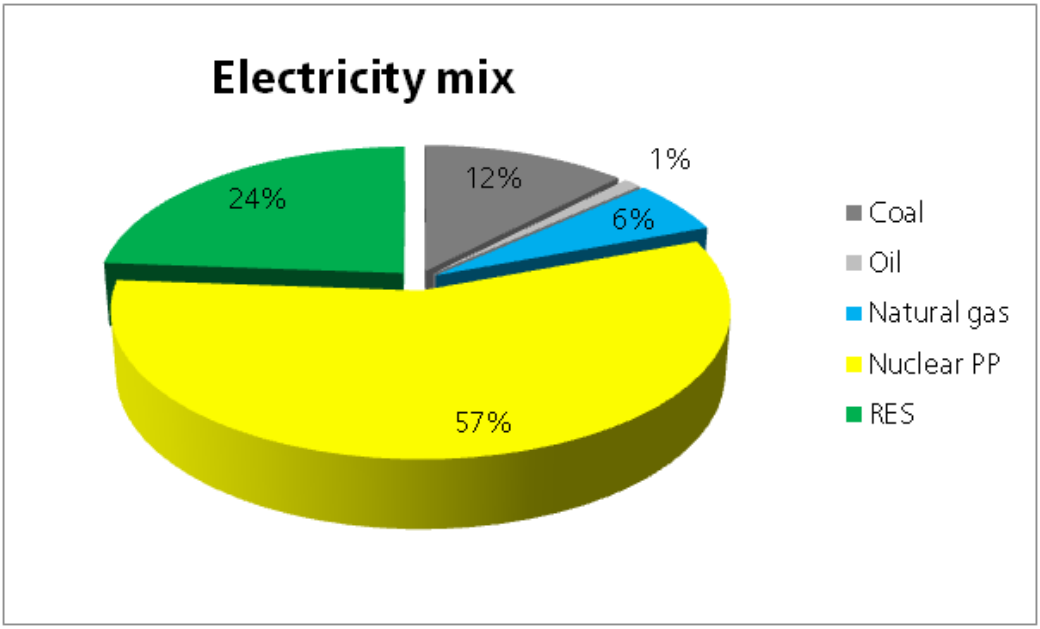

Figure 2: Electricity sources as share of total electricity production in 2014. Source: Ministry of Economy of the Slovak Republic, 2016.

Slovakia relies heavily on nuclear power plants in its electricity mix. The nuclear capacity is currently being expanded, with two nuclear blocks due to go online within the next two years. RES accounted for a share of 24% in electricity production in 2014 – due to Slovakia having been a net importer of electricity in that year, the RES share in electricity consumption was 23%.

Key figures for RES-E

Existing support scheme type/types	The main support instrument is a technology-specific feed-in tariff. Furthermore, renewable electricity is exempt from the excise tax on electricity production. To a lesser extent, investment grants from the European Regional Development Fund are available to small wind and PV installations (RES legal, 2014).
Renewable share in gross final energy consumption	11.6% in 2014 (Eurostat, 2016), compared to a binding target of 14% in 2020
Renewable share in total electricity generation	23% in 2014 (Eurostat, 2016), compared to an indicative NREAP target of 24% in 2020
Gross final energy consumption	11.14 Mtoe
Technology focus 2015-2020	Onshore wind (5 MW in 2013, to be increased to 350 MW by 2020), accompanied by an extension of the existing hydro capacities (1607 MW in 2013; 1812 MW by 2020), some additional capacities in solid

	biomass and biogas. The original target capacity for PV was 300 MW in 2020, but stood at 588 MW already in 2013 (NREAP, Eurostat energy balances).
Compliance with RES targets	Given the 2014 shares as stated above, Slovakia has surpassed both its voluntary 2014 NREAP target of 8.9% and its 2013/2014 interim target as set in the RES Directive at 8.8% (Eurostat, 2016; Ministry of Economy of the Slovak Republic, 2010).

Slovakia wants to rely mainly on the heating sector to achieve its 2020 RES target share of 14%. In the electricity sector, the Slovakian energy strategy foresees a concentration on nuclear as well as the diversification of sources of fossil fuels in order to ensure supply security. Overall, cost considerations are very dominant in Slovakian energy policy, with the energy intensive industry lobbying against the development of higher-cost technology options.

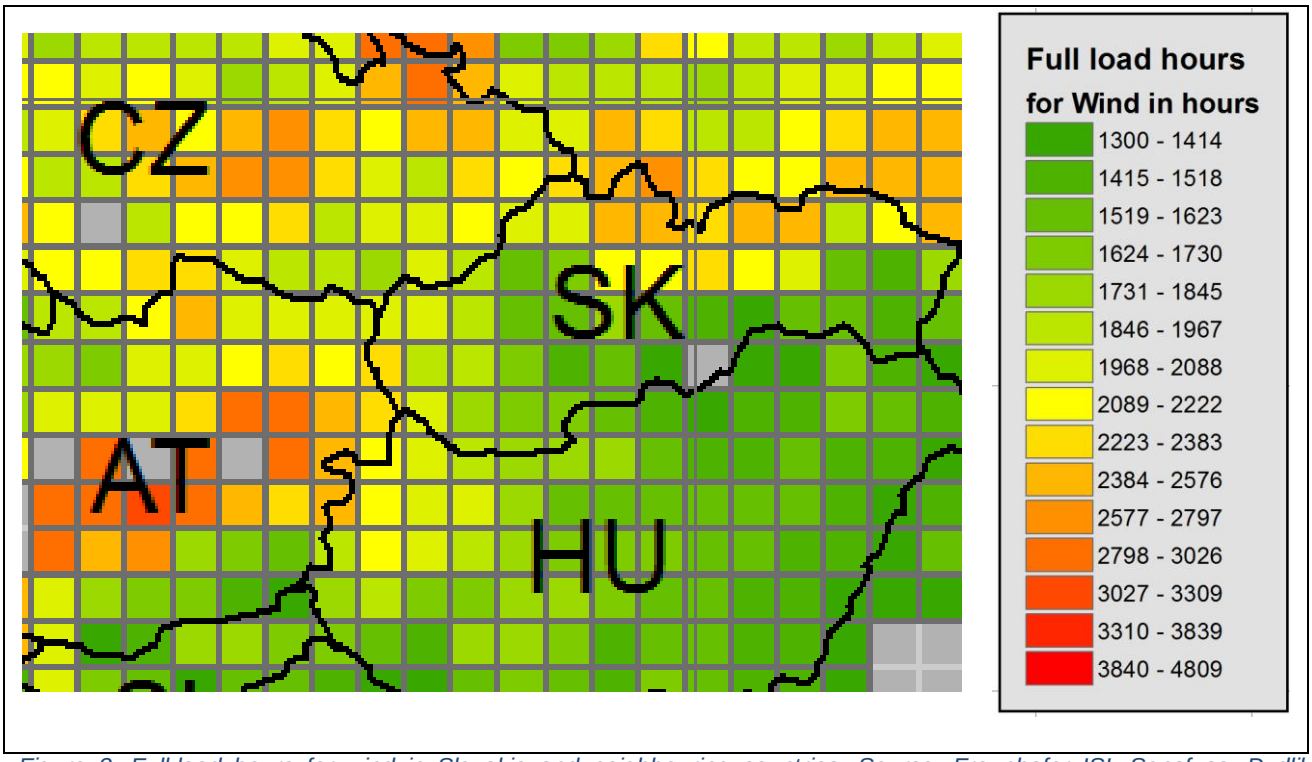

Figure 3: Full-load hours for wind in Slovakia and neighbouring countries. Source: Fraunhofer ISI, Sensfuss, Pudlik, Schubert, 2013

Wind resource potentials in Slovakia are low to moderate for the largest part of the country. Some areas in the north see up to 2500 annual full-load hours, but the terrain is mountainous, making construction more challenging. In addition, a significant portion of the northern mountains are protected areas, thus not allowing for wind parks to be built. In contrast, the western part of Slovakia is flatter. It borders the Austrian Parndorfer Plain which boasts some of the best wind resources in inland Europe. West and central Slovakia offer some sites with 2000 full-load hours or more. The geographical proximity to Austria further makes this area

attractive to experienced Austrian developers, as their existing technical teams can easily reach this part of Slovakia for trouble-shooting and maintenance of wind parks. Therefore, most existing and pre-developed wind projects are situated in this part of the country.

RES targets and technology focus

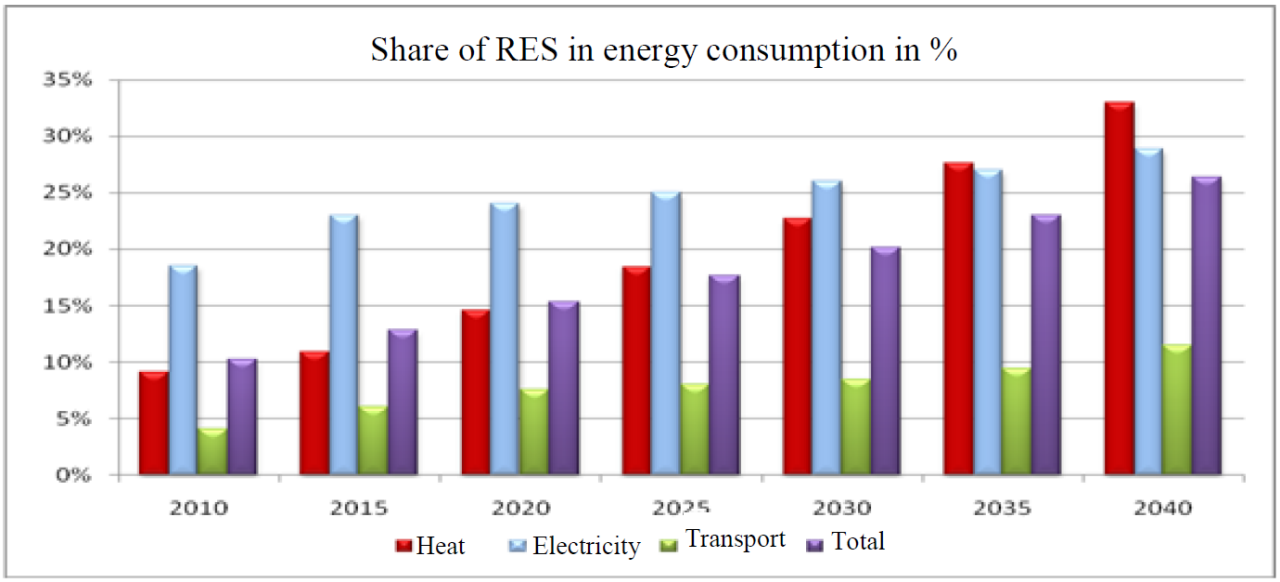

Figure 4: Projected renewables shares by sector. Source: Ministry of Economy of the Slovak Republic, 2014, p.60

Projections until 2020 take into account the trajectories foreseen in the Slovakian NREAP. The NREAP foresees a focus on renewable heat, mainly driven by the need to restrict dependency on fossil heating fuels. In the near term, renewable electricity therefore receives less attention, and support will be gradually restricted (Ministry of Economy of the Slovak Republic, 2014, p.60).

According to its NREAP, Slovakia has overfulfilled its PV plan by far and is thus planning to add no or little PV to its existing capacities until 2020. In contrast, no new wind installations have been built in Slovakia in recent years and the overall installed capacity is very low with 5 MW of onshore wind (Eurostat, 2015). This is not in line with the Slovakian NREAP, which foresees a significant increase of wind capacities to 350 MW by 2020. Roughly 200 MW worth of projects are currently still in the planning stage or have had their operations suspended (BNEF, 2016).

Main pillars of current RES-E support policy

For renewable electricity, Slovakia currently employs a FIT scheme under which installations receive a fixed price for a duration of 15 years. The FIT level stands at 7.03 €c/kWh for wind and 9.89 €c/kWh for PV, Electricity is remunerated at FIT level for wind installations up to 15 MW and roof-top or building-integrated PV

up to 30 kW. For larger plants, a proportionate amount of generation is remunerated at market price (RES-legal, status late 2014).

PV installations leaped from 19 MW to 496 MW between 2010 and 2011, thus exceeding the 2020 target volume. Growth has slowed since, after a reduction in support levels. In contrast, the wind sector has stagnated. Support levels for wind are low, but still feasible for some projects. As will be described below, the main barrier to the Slovakian wind industry are non-financial.

Main challenges of current support policy and motivation for RES auctions

At the moment, the support for large RES installations in general is in question in Slovakia. Decisions can be expected after the national elections in early March. For the time being, the Ministry of Economy is mainly interested in feasible auction designs as it wants to be prepared for possible substantial changes in the support scheme. Auction-based support would be in line with State Aid regulation, which requires newly notified support measures for large RES to be based on a competitive mechanism. It would also help to address the concerns of many political players regarding support expenditures and the possibility to limit supported volumes.

A more detailed economic and legal evaluation would be necessary to determine whether keeping the current FIT scheme may also be an option, given State Aid regulation. The current support scheme is experiencing its own difficulties. No wind parks have been built in Slovakia since 2009. The main reason for this, according to project developers, are severe administrative barriers concerning grid access. Pre-developed wind projects are in the pipeline but cannot proceed because the grid authority has not granted any connection permits for several years. This grid access barrier will not be solved by replacing the existing FIT scheme with an auction-based scheme. Instead, it has to be removed independently from the support scheme in place. Nevertheless, any future auction scheme will have to be coordinated with grid permitting procedures. Opening a policy discussion on auction designs may therefore help in re-opening the policy discussion on grid access and the associated barriers, according to an interviewed policy maker.

Auction status

So far, Slovakia has no experience with auctions to install capacities in the electricity sector, or in the energy sector in general. RES auctions are not officially being discussed yet. The Ministry of Economy is currently collecting information on policy options.

3 Suggested auction design

Assumptions

The following assumptions on the policy framework are made to form the basis for the subsequent considerations on auction design options.

Table 1 – Assumptions on policy framework

Characteristics	Description
Objectives	Given the high importance of cost considerations in the Slovakian RES policy discussion, along with the fact that little RES deployment has taken place in Slovakia in recent years, we assume that the auction design will have the following two objectives : • **to ensure RES deployment at least cost** • **to provide a stable, reliable, and transparent support mechanism which will revitalise the Slovakian RES sector**
Selection criteria	Since cost considerations play a very important role in Slovakian RES policy making, **we assume a single-criterion auction focusing solely on the price**. Other criteria such as location, actor diversity, or domestic industry development usually lead to higher prices. We therefore assume that these criteria are not considered here.
Technological diversity (focus and differentiation)	Considering the technology trajectories in the NREAP, and taking into account the importance of least-cost RES-E deployment, technology-specific auctions for onshore wind seem attractive. These could possibly be followed by auctions for large-scale PV in the long term. Our analysis will thus be based on the assumption that **technology-specific onshore wind auctions** shall be introduced in the near future.
Year of introduction	If policy decisions in favour of continued RES support are made in the course of 2016, auctions might be launched in 2018. **Assuming** (optimistically) **that auctions are launched in January 2018**, this leaves three years to the end of 2020.
Auction Volume (What is auctioned?)	350 MW of wind are to be installed by 2020 according to the NREAP. Given the current political climate, this volume is to be understood as a maximum. We recommend recurring auctions, giving the domestic wind sector a long-term vision

	and investment security. We thus assume that the maximum volume of 350 MW will be pursued via recurring auctions, but that a further continuation of auctions beyond this volume is unsure – a factor that will cause insecurity among project developers. With 5 MW installed (2013), a maximum of 345 MW thus remain to be built. It is unlikely that an auction scheme can be set up sufficiently fast to bring this capacity online by 2020. However, in the absence of other strategic wind deployment trajectories, we will **assume that Slovakia will aim to at least issue funding approvals for the missing 345 MW by 2020**. If all the lacking capacities were funded under auctions, and auctions were started in early 2018, this would imply an auction volume of 115 MW/ year. At the moment around 200 MW are in the pipeline, mainly waiting for grid connection permits. If the grid connection barrier were removed soon and all the pipeline projects were to obtain funding under the existing FIT scheme, this would leave only a gap of 145 MW, resulting in an auction value of roughly 50 MW/year. However, this latter scenario is a) rather unlikely, and b) deploying 200MW in a short time frame and then introducing auctions with a comparably small annual auction volume to 50MW would imply inconsistent policy. In conclusion, we assume that **a probable target volume for an auction scheme would be in the range of 100-115 MW/year**, for a duration of three years.

General characteristics of proposed auction

Table 2 – Characterisation of proposed auction

Characteristics	Description
Contracting authority	URSO, the Regulatory Office for Network Industries, is a possible candidate to act as auctioneer, according to an interviewed policy maker. URSO is a regulatory body responsible for the electricity, water, gas and heat sectors, and as such, covers administrative activities for the short-term electricity market as well as regulatory tasks regarding transmission, distribution, generation and supply of electricity.
Periodicity/Timing of the auction	Auctions should take place regularly, with a transparent schedule enabling project developers to anticipate when future auctions will take place. We recommend that auctions should take place at least once a year, preferably more often.

Auction Volume (What is auctioned?)	As is the case in most RES auctions, we recommend for the auctioneer to auction a certain capacity volume [MW] and to ask for bids to be expressed in terms of a per-unit price [€c/kWh]. This price will then be paid for a predetermined duration (e.g. 15 or 20 years). The price can generally be defined as a FIT or a FIP on top of the electricity market price. However, given the current State Aid regulations, it is unlikely that a FIT-based auction scheme would receive approval from the European Commission. This leaves sliding FIPs and fixed FIPs as the two main practicable options.
Size limits (Min./max. size of projects)	Based on the assumption that actor diversity is not a criterion in this auction, we do not suggest size limits on bidding projects.

Specific design elements of the planned or proposed auction

Table 3 - key design elements for planned RES auctions in Slovakia

Design Elements	
Auction format (Single- or multi-item auctions)	Two basic types of auctions are regularly applied in the RES sector: a) Single-item auctions, in which the auctioneer selects a site for the future RES installation and pre-develops the site to a certain degree (e.g. environmental evaluations, resource availability, evaluations on geological structure, etc.). Bidders then compete for the right to construct their RES installations at this specific site. This auction format can be suitable for very large projects where the project pipeline contains only few new projects at any given time, or where infrastructure such as the electricity grid constitutes a bottleneck and the location of new projects must be known well in advance in order to be coordinated with new grid construction. This auction format is often applied for offshore wind, but may be suitable for onshore wind projects as well. b) Multiple-item auctions, in which the auctioneer has a target volume [x MW] for the auction round, and bidders compete with projects which they have pre-developed at their chosen sites. Winning projects are accepted until the target auction volume is full. This auction format can be suitable when target volumes are so big that several projects will be needed to fill them, when a larger number of new projects regularly

enter the project pipeline, and when grid infrastructure is already available. This auction format has been applied to onshore wind.

For the case of Slovakia, there are arguments for and against each format:

Multiple-item auctions:

+pro

- Assuming an auction volume of approximately 100 MW/year, multiple wind projects would be required to fill this volume
- some pre-developed projects (up to 200 MW) exist in Slovakia and could move forward as soon as the grid connection barrier is removed

-contra

- the level of competition is unknown, but probably low at least in the first round(s). With multiple projects trying to fill a higher target volume, competition will be even thinner than for one single project.

Single-item auctions:

+pro

- As the wind industry is hardly developed, competition levels may be low, calling for auction volumes lower than 100 MW/year. In this case, auctioning single projects may be more suitable at first, until more players have entered the market.
- grid connection is a bottleneck. If this is a real infrastructure problem (rather than just an issue of political willingness), single project sites could be more easily coordinated with new grid development

-contra

- the already pre-developed projects at multiple sites would have to be supported otherwise or would be lost to the pipeline
- high effort for public authority to pre-develop the site. Slovakian public authorities are likely to lack the necessary experience, institutional capacity and resources for this task.

Another possibility would be a combination of both formats, i.e. carrying out some rounds of single-item auctions, allowing the auctioneer to collect experience and the industry to build knowledge. The scheme could later move to multiple-item auctions, allowing the already pre-developed projects to compete. However, the benefits of this may not outweigh the additional effort of setting up two different auction formats

	with very different institutional frameworks. In conclusion, based on the currently available information, multiple-item auctions seem more promising than either single-item auctions or a combination of the two. A closer inspection of the local market and political conditions would be necessary to issue a final recommendation.
Auction type (static or dynamic)	An auction may be carried out in a static or a dynamic format. Static formats are usually easier to understand both for inexperienced auctioneers and inexperienced bidders. Dynamic auction formats, on the other hand, include ascending or descending clock auctions (for multiple items) and Dutch or English auctions (for a single item, but this is rather uncommon for RES so far). Dynamic auctions can be useful in markets where price levels are not well known, as bidders receive information on competing bidders' price levels and bidding behaviour throughout the different bidding rounds. However, dynamic auctions are also more prone to implicit collusion among bidders, especially if the market is small and bidders are few. Static auctions provide no information on the behaviour of other bidders while the auction is ongoing. However, if the resulting prices are published ex post, learning effects regarding typical price levels will take place over several auction rounds. **Static auctions:** **+pro** • the wind industry in Slovakia is inexperienced, which calls for a simple, static auction format. • even though information of competitors' bidding behaviour is not available during the auction, learning can take place over several auction rounds (if the auctioneer decides to publish the auction results) • implicit collusion is less likely, as no interaction between bidders is foreseen in the auction itself **Dynamic auctions:** **+pro** • as the Slovakian wind sector is immature, the price levels to be expected from an auction are not well known – neither to the auctioneer nor to the bidders. Dynamic auctions provide information to bidders about their competitors' behaviour during an auction and can thus result in more realistic bids. This must be balanced against inexperienced bidders' need for simple

	auction procedures. For the sake of simplicity, a static format may be more suitable for an immature market such as Slovakia. The problem of lack of experience regarding appropriate price levels can partly be addressed by setting a realistic ceiling price (see details further below). We suggest publishing auction results after each auction round, as this promotes learning among bidders for future auction rounds and also improves public acceptance.
Pricing rule	The pricing rule determines which project will win the auction and which price will be paid to this project. For a single item auction, we assume that the project which entered the lowest bid will win the auction. Correspondingly, in a multiple-item auction, the lowest bidders will be accepted until the desired auction volume is full. There are two ways to remunerate the winning project(s): They either receive the price which they themselves offered in their bid, or they receive a price determined by their competitors, i.e. the highest accepted bid or the lowest rejected bid. Among static auctions, this leaves four basic auction formats. Although, as indicated above, multiple-item auctions may be more suitable for the case of Slovakia, we list the possibilities for single- and multiple-item auctions below: **Single-unit auctions** / **Multiple unit auctions** First-price auction (winning project is paid its bidding price) / pay-as-bid auction (winning projects receive their respective bidding prices) Second-price auction (winning project is paid the next-higher bidder's price) / uniform price auction (winning projects are all paid the same price, either the highest accepted or the lowest rejected bid) In more detail, for the case of multiple-item auctions, there are arguments for and against the different pricing rules: **uniform pricing:** **+pro** • uniform price auctions are incentive-compatible (in theory, and assuming that each bidder only enters one project into the competition). This means that bidders' own prices do not influence the price they will be paid in case of

	winning. Assuming that they behave rationally, they have no incentive for strategic bidding and will thus bid at their true cost. **-contra** • the same bidder may enter multiple projects. This is a common occurrence in RES auctions. In such a case, bidders may behave strategically, bidding at true cost with some projects while attempting to drive up the price with secondary projects. • Some bidders improve their chances by entering bids below their costs, hoping that the marginal bidder will set an attractive price for all winning projects. Such irrational bidding strategies will backfire if all bidders behave in this way, as was shown for instance in the recent Spanish wind onshore and biomass auctions where all winning bidders bid at a price of zero (del Río, 2016). If winning prices are below costs, projects are more likely to fail, thus threatening realisation rates. Therefore, uniform pricing rules can be risky especially for inexperienced bidders.
	pay-as-bid pricing: **+pro** • in case the same bidder enters multiple projects, these projects do not influence each others' prices. Strategic multi-project bidding is thus not especially incentivised. **-contra** • all bidders, even if only entering a single project into the competition, to some degree have an incentive for strategic behaviour, as their own bid influences the price which they will receive in case of winning. Risk-loving bidders will increase their bids even if this lowers their chances of winning.
	The interactions between market conditions and the results delivered by different pricing rules are complex. For an inexperienced market, a pay-as-bid pricing rule, combined with a realistically set ceiling price (see below) may be a promising option. A final recommendation would require more detailed information.
Price limits	Given the dominance of cost considerations under the current political climate in Slovakia, we recommend to set a conservative ceiling price – given the uncertainties faced by the auctioneer, it should be set rather too low than too high.

	The current FIT is set at 7.03 €c/kWh over 15 years. Some projects were pre-developed assuming this support level. The FIT level therefore provides one indication of a reasonable ceiling price for a future auction scheme. Given the increased risk to producers in an auction scheme compared to an administratively set FIT, the ceiling price may have to lie above the former support level. However, such considerations must be balanced against the strong political pressure to keep support expenditures low.
(Pre-)qualification criteria	A streamlining of grid connection procedures with the auctions is crucial. Bidding projects should be required to present access permits, as grid access is currently a crucial barrier. A discussion about auction designs will therefore have to be accompanied by a discussion about grid permitting regulation and practice.
Penalties	Penalties should be in place to ensure that winning projects are realised. If penalties are set too low, this endangers the realisation rates of the winning projects. If penalties are too high, this may discourage bidders from participating in the auction at all. Penalties in the range of 5% of project value have been implemented with good results in other auction schemes. ~~(Brazil/France. More detail/source for this).~~
Remuneration type	As mentioned above, sliding or fixed FIP are the two main options for generation-based remuneration. From a RES plant operator perspective, a sliding FIP is less risky than a fixed FIP, as total remuneration does not fluctuate with the electricity market price and is thus more predictable. Sliding FIPs can still be designed to incentivise wind plant operators to react to market signals. The benefits of sliding FIP must be balanced against the benefit of easier budget control under a fixed FIP. Overall, we would therefore recommend a sliding FIP as remuneration from the auctions.
Other specific regulations (e.g. limits on maximum granted support per project)	--
Transferability of support right	--

4 Stakeholder opinions

Undertaken interviews and other sources of information

For this case study, one political decision maker in the Ministry of Economy was interviewed. In addition, three wind project developers – two German and one Austrian – provided their opinions. Two of them have previously pre-developed projects in Slovakia, while the third has kept an eye on the Slovakian market but has not entered it due to the unfavourable conditions in recent years.

General stakeholder reactions until now

All interviewed stakeholders confirm that grid access is the single biggest barrier in the wind sector right now. One stakeholder indicated that their wind park sites are pre-developed to a high degree, have undergone a year or more of wind speed measurements and have received all environmental permits. Considering that some permits may have to be renewed, he estimates that around 6-12 months of lead time would be required to get their projects ready to enter an auction, if grid access were to be granted. The interviewed project developers suspect that lobbying may be the main reason for wind parks having such difficulty in gaining grid access, and that the political will to support renewables is lacking. The interviewed political decision maker indicates that the DSO has no political orders to refuse grid access, but is doing so of its own accord.

5 Conclusions

In conclusion, the barriers to grid access must be removed alongside the introduction of any future auction scheme in order for RES projects to actually be realised. There is reason to assume that a policy discussion about auction schemes will force all stakeholders to discuss the grid issue in parallel, thus providing a window of opportunity to improve the current situation.

If an auction scheme were to be introduced, a static multiple-item auction with pay-as-bid pricing and a conservatively set ceiling price may be a suitable format for the Slovakian market, given the information available at the time of writing. Pre-qualification criteria, especially with regard to grid access, as well as penalties for non-realisation, should be part of a future auction scheme, as they are crucial in ensuring high realisation rates. However, the interrelations between auction design and real-life market conditions are complex, and more detailed studies would be necessary to issue a final recommendation on the auction format and on the quantification of ceiling prices and penalties.

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