Technical University of Denmark

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

Report D7.1-PL, March 2016

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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 targets 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 Poland from 2016 onwards. The report focuses on the implementation process and provides the necessary background information. Furthermore the planned auction design is described and discussed both from a policy maker's and an investor's point of view. Finally, main strengths and weaknesses are identified and the scheme is discussed according to several success criteria. The proposed design is related to the findings from AURES work packages 2, 3 and 4, which included the identification of success criteria, of appropriate auction formats and suitable design elements for RES auctions, as well as the analysis of past auction implementations.

This report forms part of AURES Deliverable 7.1, which is presented in six separately paginated parts:

D7.1-INTRO	Introduction to the task 7.1 case studies: case selection and methodology
D7.1-ES	Case 1: Spain
D7.1-PL	Case 2: Poland
D7.1-SK	Case 3: Slovakia
D7.1-HR	Case 4: Croatia
D7.1-NL/DK	Case 5: Netherlands – Denmark cooperation

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

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

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1 Description of market conditions and RES auction status

Country characteristics

With its relatively large size (312,700 km^2) and population (38.5 million) Poland takes the 6th place among the EU-28 countries in terms of both indicators. In 2014 GDP per capita was 24,882 $/capita, corresponding to 71% of the EU-28 average based on World Bank (2015). GDP is on an upwards trend. The country has still relatively low electricity consumption per capita with a majority of electricity consumed by heavy industries. In the last years this relation was gradually changed leading to an increasing share of household consumption mainly due to a reduction in heavy industry activity and a gradually increase in households and in the service sector. However, the average electricity consumption per household in Poland is still lower than the EU-28 average (Majchrzak, 2014).

Electricity market characteristics

Both the generation and the retail electricity market in Poland are still rather concentrated. In 2014 the market share of the four largest companies (PGE group, Tauron, Enea and Energa) accounted for 62% in generation and 87% in retail (where the highest shares were held by the PGE group with 38% and 31% respectively) (Polska Grupa Energetyczna, 2015).

The wholesale electricity prices in Poland are generally slightly higher than in the neighbouring central European countries. In the first quarter of 2015 the average day-ahead baseload electricity price was with 38.0 €/MWh considerably higher than in Germany, the Czech Republic and Slovakia (with 28.4, 28.8 and 29.0 €/MWh, respectively). This has been a general situation over the last two years (European Comission, 2015).

Poland is the largest producer and consumer of hard coal among the EU-28 countries, also comprising the largest central heating subsector (Majchrzak, 2014). Therefore, the Polish energy sector is dominated by coal-based technologies until today. The electricity production sector features 17 large independent power stations of which 14 are fuelled with hard coal and 3 with lignite (J. Paska, M. Salek, T. Surma, 2009). In 2013 71% of the total coal consumption of 611,040 GWh was used in electricity production (IEA, 2015). Renewable energy sources still have a relatively low share in final energy consumption but the contribution has grown significantly from 1.3% in 1990 to 9% in 2012 (Majchrzak, 2014).

There is no nuclear power production in Poland until now. However, there are plans of building a first nuclear power station with start of operation in 2025. These plans are very vague and it is questionable if they will be realised (Reuters, 2015).

Key figures for RES-E

Table 1 shows key figures of the deployment of RES technologies and the respective policy measures in Poland.

Table 1: Key figures on RES technology and policy measures in Poland

Existing support scheme type/types	Biofuels Obligation, Tradable Green Certificates (TGC) (REN21, 2015)
Renewable share on total energy production	12% (2013) (IEA, 2015)
Renewable share on final energy consumption	9% (2013) (IEA, 2015)
Total energy production	824,799.6 GWh (2013) (IEA, 2015)
Technology focus 2015-2020	Onshore wind, biomass (L.W.M. Beurskens, M. Hekkenberg, P. Vethman, 2011)
Compliance with RES targets	Over-achievement of targets in wind sector and good compliance for all other sources in 2013 related to targets stated in NREAP (Eurostat, 2013), (L.W.M. Beurskens, M. Hekkenberg, P. Vethman, 2011)

RES targets and technology focus

In “Poland’s Climate Policy – The strategies for greenhouse gas emission reductions in Poland until 2020” (The Polish Ministry of Environment, 2003), adopted by the Council of Ministers on 4 November 2003, the Ministry of Environment states the long term targets and measures for the Polish development to less greenhouse gas emissions until 2020. The main target, which should be achieved, is an emission reduction by 40% in 2020 with respect to the base year 1988. The main measures concerning the energy sector are:

- Renovation of coal-fuelled installations
- Liberalisation of the energy market
- Increased use of energy from renewable sources
- Promotion of energy efficiency

Several scenarios to reach the GHG reduction targets were set up. Some of those aim to increase the share of renewables in the final energy consumption to 14% in 2020 while others do not enforce this.

The directive “Energy Policy of Poland until 2025” was adopted by the Polish Council of Ministers on 4 January 2005 and describes the main directions of the energy sector development in Poland including RES production with the target of 7.5% share of renewable energy in final energy consumption in 2010. The directive states the main objectives for the country’s energy policy (J. Paska, M. Salek, T. Surma, 2009):

- Security of energy supply

- Increasing competitiveness of the economy and its energy efficiency
- Environmental protection from the negative effects of energy-related activities

The document points towards three key technologies, which are considered to have the greatest potential: biomass, wind power and hydro power. Solar energy is only considered to play a role in heat generation.

A new directive “Energy Policy of Poland until 2030” adopted in November 2009 (The Polish Ministry of Economy, 2009), extends the RES deployment target to 15% share of renewable energy in the final energy consumption in 2020. Furthermore the directive states to use solar energy to a much greater extent than before.

At the same time, the Polish RES target for 2020 in the EU Directive from 2009 is 15% (European Commission, 2009). The corresponding expected development of RES between 2010 and 2020 as reported in the country’s National Renewable Energy Action Plan (NREAP) is depicted in Table 2 (L.W.M. Beurskens, M. Hekkenberg, P. Vethman, 2011). The current status towards compliance to these targets can be evaluated by comparing the targeted energy production and the actual energy production from Eurostat (2013).

Table 2: Targeted and achieved RES deployment in Poland between 2010 and 2020, based on the NREAP

RES	Hydropower	Solar Power (PV)	Wind Power	Biomass
Additional installations between 2010 and 2020 [MW]	200	2	5550	2150
Targeted total installations 2020 [MW]	1152	3	6650	2530
Targeted electricity production in 2013 [GWh]	2375	2	5327	8200
Actual electricity production in 2013 [GWh]	2361	1	6133	7924

Table 2 illustrates that the main focus of Polish RES deployment between 2010 and 2020 is on wind power (mainly onshore installations, accounting for 4500 MW of the expected new deployment) and biomass. Hydro power is also a key technology, where much deployment has already been achieved in the years 2002 to 2006, reaching 1081 MW installed capacity. The share of hydro power in total electricity from RES reached 57% in 2006 (J. Paska, M. Salek, T. Surma, 2009). Future deployment is therefore expected to be primarily dominated by wind and biomass.

Furthermore, the country over-achieved the targeted electricity production from wind by 15.1%, while for biomass and hydro power the targets are not fully achieved. This deviation is however not big compared to the average deviation of all EU-28 countries in 2013 of -1.6% in hydro power and -20% in biomass (Eurostat, 2013). The deviation in solar power production is not significant regarding the very small overall deployment targets for the technology.

Main pillars of current RES-E support policy

The main support mechanism to stimulate electricity production from RES was already introduced in the Energy Act of April 1997. Changes were applied in an ordinance by the Ministry of Economy in November 2006. The support is based on a system of tradable renewable energy certificates (TGC) which are issued to the producers of electricity from RES. The certificates can be sold to companies providing electricity to final consumers. These suppliers have to fulfil a RES obligation, which level is determined and occasionally adjusted by the Energy Regulatory Authority. In case of non-compliance a substitution fee has to be paid. The eligibility for receiving certificates was not limited in time, but will be limited to 15 years for existing installations under the new RES Act 2016 (Hajduk, 2015).

The second main mechanism is the obligation to the incumbent local suppliers of electricity to purchase all electricity produced by RES installations in their supplied area for the average competitive market price ("URE price") announced by the Energy Regulatory Authority (URE). This price is based on the average electricity wholesale market price of the last year excluding the balancing market (Hajduk, 2015).

Under existing law producers of electricity from RES can gain support payments both from 1) the certificates of origin and 2) the guaranteed purchase for the URE price.

Main challenges of current support policy and motivation for RES auctions

One of the main challenges in the future years will be the compliance with the CO_2 emission reduction required by the European Union and the achievement of 15% renewable share in final energy consumption in 2020.

There are still concerns that the reduction actions can lead to a substantial increase in electricity prices with negative consequences for the national economy (Majchrzak, 2014). It has been estimated that the cost of the existing support scheme would amount to PLN 8.9 billion by 2020. These costs are expected to be reduced by the auction system to PLN 4.26 billion (Rogozinski, 2015).

Two main issues of the current support policy have been voiced by Dixson-Declève (2013):

- The low transparency and frequent change of regulations on the presentation (when and how the certificates have to be presented by obliged suppliers) and eligibility of certificates combined with an inconsistent target-setting for the share of RES-E have created long-term uncertainties for new investments.
- The tradable certificate system disproportionally favours cheapest-to-market solutions, which are not necessarily innovative or most effective.

The first issue had the effect that banks are reluctant to provide financing for RES projects. Especially non-recourse project financing is very difficult to obtain (Norton Rose Fulbright, 2013).

The second issue is indicated by the fact that the TGC price was mainly determined by the compensation fee for non-compliance (buy-out price) and not by the induced demand and supply equilibrium. Around 15% of the

RES obligations are fulfilled by suppliers choosing the compensation option (Dixson-Declève, 2013). The fee has been PLN 286.74 per MWh (~66.5 €) in 2012 and will be fixed to PLN 300.03 (~69.5 €) per MWh from 2016 onwards (Hajduk, 2015), which is a low support level compared to other European countries. This issue led to the predominant allocation of system revenues to biomass co-firing and hydro power (more than 75% between 2006 and 2012) (Dixson-Declève, 2013).

Another uncertainty concerns the grid connection (especially in the wind power sector) due to infrastructure issues in the transmission and distribution grid (Dixson-Declève, 2013). This is a critical issue, both in terms of risk of delayed commissioning and curtailment due to congestion in the grid.

Auction status

Poland has not used auctions to allocate support for RES until now. Going forward, it is has been decided to implement auctions for all new projects with an installation size larger than 1 kW from 1 July 2016 (Biznes Polska, 2015). Thus, the implementation process is in a finalising stage.

A simulated auction was conducted by the Polish Wind Energy Association from 8 to 13 May 2015.The detailed outcome was only communicated in a seminar for the participants. Underbidding appeared to be an issue (Mott, 2015).

2 Planned auction design

The framework for undertaking auctions for RES support in Poland is determined in the New RES Act from April 2015. The auction design as described in this law is presented in the following tables. Please note, however, that the introduction of auctions was postponed by six months after the change of government in December 2015. Further amendments are in principle still possible. These changes would most probably concern the amount of energy auctioned, both overall and for different categories of technology and installation size, i.e. different auction pools.
Table 3 shows the main characteristics of the proposed auction design. Key design elements are presented in Table 4.

General characteristics of the planned or proposed auction

Table 3: Main characteristics of planned RES auctions in Poland

Characteristics	Description

Name of auction scheme	Polish ”New RES Act” 2015, chapter 4
Objectives	The main objective is to reduce the costs for renewable energy support and create further incentives for investments in renewable energy projects for reaching the climate policy targets of 2020 and 2030 (emission reduction and RES share in final energy consumption). Furthermore, the market environment should become more transparent and predictable.
Contracting authority	Energy Regulatory Office Department of Support Systems dsw@ure.gov.pl Contracts signed with: Renewable Energy Settlement Operator S.A./Operatora Rozliczeń Energii Odnawialnej A.S. (OREO)
Main features	The auctions will be organised as multi-item, energy based auctions. Bids will have to include a total amount of energy and a price per kWh for which the producer is willing to sell it. The auctions will be pay-as bid auctions for sliding feed-in premiums or feed-in tariffs in case of a total installation size of less than 500 kW. All bidders will have to apply for a prequalification license. There will be separate auctions for installation sizes above and below 1 MW. In the pool >1MW a cap is specified for energy provided by technologies with a capacity factor of less than 0.46.
Technological diversity (focus and differentiation)	The auctions will not be technology-specific. However, there will be separate auctions for installation sizes below and above 1 MW, as well as for new and existing installations. Technology-specific bid price ceilings will be set in each auction.
Year of introduction	The first auction will be performed in 2016.

Lead time before auction	The concrete auction date together with the respective amounts auctioned must be announced at least 30 days before an auction is undertaken.[1]
Periodicity/Timing of the auction	Auctions will be undertaken at least once a year, starting in 2016.[1] The last auction can be undertaken in 2021 as the support payments shall discontinue in the end of 2035 and the maximum support period is15 years[2]. The value and volume of energy which can be auctioned in each year has to be announced by the end of October in the preceding calendar year. The volumes for the first year of auctions were announced in May 2015 by the Council of Ministers. Ceiling prices for the first auction were announced in December 2015 and the concrete auction date is planned to be announced by the end of March 2016.[3]
Auction Volume (What is auctioned?)	The volume to be auctioned in 2016 is 55 TWh in total which is to be delivered during the support period of 15 years[4]: The volume is divided into several pools: - 4.6 TWh of existing installations - 12.6 TWh of new installations <1MW - 37.8 TWh of new installations >1MW Maximum 30.9 TWh of the new installations and 2.3 TWh of the existing installations may come from installations with a capacity factor of less than 0.46. A more detailed overview is given in Table 5. These volumes for 2016 may be split into several auction rounds. The volumes in the upcoming years will depend on the realisation rate form previous auctions.

[1] "The new Polish renewables legislation", Norton Rose Fulbright, April 2015
[2] "New law on RES – the RES Act signed by the President", Linklaters, March 2015
[3] "New Act on renewable energy sources", Dentons, March 2015
[4] "Volume and value of electricity to be auctioned in 2016", Dentons, April 2015

Budgetary expenditures per auction and per year	A budget is determined for the total value of auctioned electricity. Each year, the Council of Ministers will decide upon its amount. For 2016 the total value of auctioned energy has been set at PLN 19.9 billion (approx. 4.6 billion €), of which approx. 9% will be allocated to existing installations and the rest to new installations[4].
Size limits (Min./max. size of projects)	There will be no general size limits for single bids. However, there is a practical limit for each bidder derived from the maximum auctioned volume dedicated to the respective auction pool. Furthermore, there will be a separate auction for installations of <1MW.

Specific design elements of the planned or proposed auction

Table 4: Key design elements for planned RES auctions in Poland

Design Elements	
Auction format (Single- or multi-item auctions)	Homogenous multi-item auction
Auction type (static or dynamic)	Sealed-bid auction (static) conducted on an electronical platform[5]
Selection criteria	Price-only
Pricing rule	Pay-as-bid pricing rule[6]
Price limits	Technology specific price ceilings, different for 18 categories distinguished by technology and/or installation size[5]
(Pre-)qualification criteria	The prequalification criteria have to be met by new installations to obtain a certificate valid for 12 months. This

[5] "The new Polish renewables legislation", Norton Rose Fulbright, April 2015
[6] "RES auctions in Poland – new opening?", Dr. Jan Raczka, presentation on Vienna Forum on European Energy Law, March 2015

	certificate is needed to participate in an auction and is issued by the Energy Regulatory Authority (URE)[5]. The following elements are included: - Financial capability requirements - Preliminary licenses (local final construction permit, for off shore wind farms only a final environmental permit) - Documentation requirements (schedule for implementing the project) - Technical requirements (grid connection agreement executed with the relevant grid operator)
Penalties	There is a penalty for **total non-compliance**, i.e. failing to realise the project within the contracted time period. A new installation will be required to start generation within 48 months. For solar PV installations a period of 24 months applies and for offshore wind installations a period of 72 months[7]. The penalty for total non-compliance is PLN 50,000 (~11,300 €) per MW contracted installation capacity (Sekściński, 2016). Furthermore, the scheme includes a penalty for **production deficit**, i.e. failing to deliver the full contracted electricity volume. Delivering less than 85% of the offered volume in a settlement period of 3 years will result in a financial penalty at the rate of 50% of the awarded price times the total undelivered electricity.[7] Implicitly this also penalises the delay of generation start since in such case it is likely that the contracted electricity volume cannot be delivered in the first settlement period.
Actor diversity (Exceptions from requirements for small plants/developers?)	There will be separate auction pools for existing installations and new installations. Both pools will be further split into pools for <1MW and >1MW installation size. Separate auctions will be conducted for each of the four groups, within which all technologies will compete against each other.

[7] "The new Polish renewables legislation", Norton Rose Fulbright, April 2015

	However, different price ceilings apply.
Remuneration type	All remuneration will be energy related and payed for 15 years. However, no support will be payed later than 31 December 2035 (31 December 2040 for offshore wind installations). Installations with a total size of less than 500 kW will receive a Feed-in Tariff (FiT), while larger installations will receive a sliding Feed-in Premium (FiP) reimbursing any negative balance between the daily average value of energy sold on the day ahead market and the value calculated using the auctioned price. The daily average price will be based on the hourly weighted average prices in hours when electricity from the respective RES installation was delivered. The auctioned price will be annually indexed using the Polish Consumer Price Index[9]. In case that an installation supported by FiP will face a positive balance (i.e. the total value of energy sold on the market in a settlement period is higher than the guaranteed price) it will be settled during the following periods.[8] The calculation of the negative balance will not include periods where the market price is below 0 for at least 6 consecutive hours of delivery.[9] Payments are only received for the contracted energy. Excess production is not supported.[10]
Other specific regulations (e.g. limits on maximum granted support per project)	There is a state aid threshold, i.e. the total value of support granted over 15 years may not be exceeded.[9] The threshold is calculated by the following formula $$S_{max} = E_{15} * (p_{ref} - p_{URE})$$ Where E_{15} is the total amount of energy sold over the support period, p_{ref} is the reference price (price limit) applicable on the bid submission date and p_{URE} is the reference competitive market price calculated by the URE applicable on the previous year of the auction.

[8] "New law on RES – the RES Act signed by the President", Linklaters, March 2015
[9] "The new Polish renewables legislation", Norton Rose Fulbright, April 2015
[10] "RES auctions in Poland – new opening?", Dr. Jan Raczka, presentation on Vienna Forum on European Energy Law, March 2015

	The total value of support will be calculated including FiP/FiT, green certificates, tax credits and exemptions related to RES generation and any other operational aid.[11] The methodology of calculation will be specified by the Ministry of Economy in an ordinance which has not been published yet.
Transferability of support right	The support right is not transferable after the auction. However, it is possible to sell the whole project with the associated support contract as a Special Purpose Vehicle.

Additional information regarding characteristics and design elements

Polish auctions will be organised with special volume restrictions. Table 5 presents the distribution of the total auctioned amount into different pools as valid for 2016.

Table 5: Planned auction volume and value for the first allocation round in 2016 (Krasnodebski, 2015)

Type of RES installation	Total Volume (MWh)	Max. of total in RES with capacity factor <0.46	Max. Value (PLN)
Existing installations	4,579,491	2,289,745	1,744,694,319
New installations total	50,449,950	30,907,350	18,201,331,716
New installations <1 MW	12,612,488	-	5,927,933,456
Total auctioned energy:	55 TWh		

In general, projects which do not commence electricity production before 30 June 2016 will no longer be eligible for tradable certificates but can only apply for support under the new auction scheme. Existing installations which started operation before 30 June 2016 can also decide to participate in the auction and will lose eligibility for tradable certificates in case of winning in the auction (Norton Rose Fulbright, 2015). However, already received support from selling certificates can reduce the maximum obtainable support under the auction scheme as stated in Art. 39, paragraph 2 of the “New RES Act”. An upcoming ordinance will

[11] "The new Polish renewables legislation", Norton Rose Fulbright, April 2015

determine to what extent the previously received support payments can decrease the maximum amount of granted support from auctions.

Table 6 shows selected reference prices as published by the Ministry of Economy in September 2015 to apply in 2016. The reference prices determine the technology-specific price ceilings for bids.

Table 6: Selected reference prices for 2016 published by the Ministry of Economy (Krasnodebski, 2015)

Technology type	Reference price [PLN/MWh]	Technology type	Reference price [PLN/MWh]
Onshore wind energy >1MW	385	Solar energy >1MW	445
Offshore wind energy	470	Solar energy <1MW	465
Dedicated biomass <50MW	415	Geothermal installations	455
Dedicated biomass >50MW	420	Hydropower >1MW	480
		Hydropower <1MW	445

3 Similarities and differences of the planned or proposed auction to existing designs

Auction volumes for delivered energy can also be found in the Brazilian RES auctions. However, the combination of both a volume and a budget cap as in the Polish auction design is quite unique. The 3-year settlement periods and the related penalty for production deficit is also a new feature which has not been used in other auctions before. As the energy volume is contracted, RES investors face the risk of resource availability and forecasting uncertainty within these settlement periods.

Pay-as-bid pricing rules and an online-based auction procedure are rather common features in auctions across the world and have e.g. been used in France, Germany, California and many other countries.

In general, there are several similarities to the auction design in Germany, especially regarding the details of remuneration for the sliding FiP, e.g. that no support is paid out if the market price is below zero for at least six consecutive hours. However, the German design of determining the market value for electricity generated from a certain technology (i.e. wind or solar) based on the weighted average of prices and respective production volumes has not been chosen for the Polish auction. Instead, the daily average market reference price is calculated based on all spot trades (and their weighted average based on trading volumes). This may put technologies that have a negative correlation with the market price (as may be expected for wind) into a worse position than others.

Only a few other countries in Europe undertake auctions that pool several technologies together, amongst these are the UK and the Netherlands. In the Netherlands, separate auctions are conducted for offshore wind power. In Poland as well as in the UK, the auction volumes are split into several pools. The differentiation in the UK is based on the type of technology while the defining criteria in the Polish design are installation size and capacity factor. Especially the latter criterion has not been commonly used in other auctions so far. The technology-specific price ceilings are similar to the design in the UK and in the Netherlands. Furthermore, the

UK faces a similar situation as Poland having a tradable certificate scheme now functioning in parallel to the auctions.

There is no exemption from auctions for small installations, which is different to most auction schemes applied in the EU. Instead, all installations of less than 500 kW will receive a FiT instead of a sliding FiP and are so included in the auction with a different remuneration type. The proposed framework for RES auctions in Croatia includes very small installations as well.

4 Implementation process

Responsibilities and roles

The RES auctions are announced and organised by the Energy Regulatory Office (”URE”), which also determines the auctioned volume for each round. However, the total maximum auctioned amount and volume per year is announced in ordinances by the Council of Ministers in the preceding calendar year (latest on 31 October) (Sejm, 2015).

Winning bidders will sign contracts with the newly established Operator of Renewable Energy Settlements (“OREO”), which is a company wholly-owned by the government. The OREO will be responsible to clear any negative balance. This is defined as the difference between the energy values using the hourly weighted average electricity price from all spot trades when electricity from the RES installation was delivered (published by the Polish Power Exchange TGE) and the auctioned energy price of a winning bidder (Norton Rose Fulbright, 2015).

Projects with an installation size of less than 500 kW will sign a power purchase agreement with the local obliged supplier which has to buy all generated electricity for the auctioned price. The OREO will also be responsible to clear the negative balance of the obliged suppliers (the difference between market price and price stated in the power purchase agreement) (Norton Rose Fulbright, 2015).

Finally the OREO will be responsible to calculate the total costs of support. These will then be carried through to the final electricity consumers in form of a “RES-fee”, a public service obligation that is added to the electricity bill (Linklaters Warsaw Energy Team, 2015).

Timing

The discussion of a reform of the Polish system for renewable energy support started already in 2011 with a first governmental proposal (Norton Rose Fulbright, 2015).

First, the discussion led to the proposal of a fixed feed-in tariff system similar to the German model which was rejected in December 2013. In early 2014 Adam Jasser (Minister in the Office of the Prime Minister) came up with the idea to use an auction system for RES support (Raczka, 2016). A following exhaustive discussion and design period led to the introduction of auctions in the “New RES Act” of February 2015.

Legislation and regulatory implementation

In February 2015 the new RES act was published after nearly 3 years of efforts to clarify the future support for renewable energy (Biznes Polska, 2015). Chapter 4 of this act, which sets out the new support mechanisms was planned to come into force on 1 January 2016. It fundamentally changes the support mechanism to an auction based model (Hajduk, 2014).

An amendment to the New RES Act entered into force on 31 December 2015 postponing the transition from the existing support scheme to the auction scheme to 1 July 2016. It can be assumed that the first auction may take place in November 2016 and in any case no earlier than 30 July 2016 (since the auction has to be announced at least 30 days before it is undertaken) (Krasnodebski, 2015).

After 1 July 2016 the current tradable certificate scheme will function in parallel with the auction scheme, safeguarding the rights of existing RES producers. Existing installations will thus remain eligible for green certificates, however, the period of eligibility will be restricted to 15 years. It is also possible for existing projects to switch from the certificate system into the auction system (Norton Rose Fulbright, 2015).

5 Stakeholder opinions

In this section two kinds of stakeholder opinions are presented. First, general opinions which have been published during the legislation process are presented. The subsequent section is based on answers to targeted questions used in stakeholder interviews specifically for this study.

General stakeholder reactions until now

It is argued that, due to the volume restrictions in the auctions, a high number of projects might be rejected although they already are in a late development stage. Such rejected projects will have to be kept on hold for a subsequent auction round and will possibly not be built at all (Mott, 2015). A too low frequency of auctions could negatively affect the strategic behaviour of investors since losing an auction means a long waiting time. This could lead to underbidding in order to be able to begin construction of planned projects (Łuba, 2014).

The proposed reference prices for 2016 for onshore and offshore wind energy (see Table 6) are considered by some stakeholders to be too low to create sufficient incentives for independent investors (not state-owned,

large energy companies). The reasons for that are seen in an unrealistically low assumed weighted average cost of capital and in disregarding the profile costs resulting from the specific production profile of wind power. The price ceilings are also regarded as too low compared to reference prices in other European member states using auctions for RES support (Polish Wind Energy Association, 2015).

Interviews

Five stakeholders were specifically interviewed regarding the Polish auction design and its implementation process. Table 7 lists the involved stakeholders and their abbreviation for the subsequent quotes.

Table 7: Stakeholders involved in the interviews concerning the Polish RES auctions

Name	Position and role	Abbreviation
Dr. Andrzej Ancygier	• Researcher in Environmental Policy Research Center, FU Berlin • PhD thesis on Polish RES policy	AA
Arkadiusz Sekściński	• Director of Polish Wind Energy Association (PWEA) • Association strongly involved in the legislature procedure from the very beginning and conducted an auction simulation	AS
Agnieszka Wojnarowska	• Project Development Manager at RWE Renewables Poland • Strongly involved in the preparation of projects which are going to apply for auctions • Involved in the legislation procedure through organisations as PWEA and PKPP Lewiatan	AW
Dr. Jan Rączka	• Consultant in The Regulatory Assistance Project (RAP) • Involved in the legislation process of RES Act from first draft	JR
Mariusz Radziszewski	• Head of Renewable Energy Sources Unit in the Polish Ministry of Energy	MR

Opinions on the planned auction design

Generally, all stakeholders appreciate the new stability and predictability of the auction support system after several years of unclarity. From an investor's perspective, the long term risk of an investment in a renewable energy project is perceived lower in the auction scheme as compared to the green certificate system. This is mainly due to the introduction of a sliding premium (AS, AW). On the other hand, the allocation risk, i.e. the risk of not winning an auction is seen as problematic (AW). Furthermore, it was mentioned that the fact that

auction volumes are only decided on a year-by-year basis puts investors into a less comfortable situation (AS) and a higher long-term clarity in the auctioned amount would be appreciated (AW).

Underbidding and therewith increased risk of low realisation rates are expected by most involved stakeholders. However, different design aspects are mentioned as reasons for this, namely the low expected frequency (AA), the low penalty level for total non-compliance (AS) and the risk of unintentional underbidding due to a lack of knowledge and experience (AW). Furthermore, it is seen as problematic that bidders could try to secure support rights with the intention to resell the project afterwards (AW, AS). Moreover, speculation on falling prices (during the allowed construction period of 4 years) may lead to unrealistically low bids (AS).

All interviewed stakeholders had some ideas for improvement of the proposed auction design. The volume cap on technologies with a lower capacity factor is generally not seen as a good solution. As reason for this was given that it creates an artificial split into two groups (AW), where high competition is expected among technologies with a low capacity factor and low competition is expected among those with a high capacity factor (AS, AW). From an investor's point of view more clarity on specific regulations (e.g. the amount of energy auctioned in each pool and how the total amount of received support will be calculated) is essential and highly demanded (AW).

Another idea was to reduce barriers for small players and municipal energy companies as for example lowering the required bank deposits or give a bonus on top of the auction price to strengthen their position (AA).

Overall, a strong incentive to reduce technology costs is seen from all perspectives (AW, AA).

Opinions on specific design elements

Most reference prices are considered as adequate. Only the price cap for offshore wind farms of 470 PLN/MWh (~110 €/MWh) is considered as too low to create incentives for investments (AS, AA). It was mentioned that there is no existing offshore wind farm in Poland yet and so no experience. The price could be reasonable if some infrastructural costs were transferred to the public, e.g. EIA studies or grid connection. It was mentioned that offshore and onshore wind should be generally treated more different reflecting their specific technological characteristics (AS).

Concerning the bid prices one stakeholder mentioned that a minimum price for each technology (e.g. at 70% of the price cap) should be defined to reduce risk of underbidding (AW).

The penalty level for production deficit is considered to be very high (AW) and strict (AA). However, it is expected that experienced investors are able to make an appropriate production forecast and can meet the 85% requirement (AS, AW). Furthermore, clear statements on how to handle non-compliance caused by external factors as grid congestion, weather etc. are missing (AW). A suggestion was to introduce a smoother way of calculating the penalty. In this way the payment should gradually increase with the amount of non-delivered electricity (AA). Unexperienced investors with weak forecasts could so be penalised more leniently.

It is not considered as a very comfortable situation for investors if auctions are announced only 30 days before execution (which is the minimum lead time guaranteed by regulation). In this case projects have to be

prepared prior to publication of the exact auction volume and then potentially be put on hold for some time (AW).

Opinions on the auction performance

Concerning incentives for additional investments the stakeholders do not see a significant increase compared to the existing support scheme. No more large wind power and similar projects are expected to be developed which would not have been developed under the certificate support scheme (AW). However, all stakeholders expect a significant increase in solar PV investments (JR, MR, AW, AA) which were not very attractive under the previous tradable green certificate scheme (AW).

The actor diversity of Polish electricity generation is not expected to change much. Some stakeholders think that the situation will stay the same even if some smaller players will participate in the auction. Many of those are expected to sell the projects to dominant state players afterwards (AS). Some have even the opinion that the existing dominant position of large state players will be strengthened under the auctions due to better access to financing and better connections to authorities (AA). From a policy maker's perspective, all actors are treated equally in the auction scheme (JR) but it is attempted to facilitate the participation of foreign investors (MR).

6 Preliminary expectations on the performance of the auction based on assessment criteria

Policy Effectiveness

The different stakeholders expect the realisation rate to be in the range of 51% to 95%. Low realisation rates are expected, mostly because measures to prevent underbidding are not considered to be sufficient. Specifically the following points are named to be weaknesses of the auction design in this regard:

- Low penalties for total non-compliance to a rewarded contract
- High competition combined with unclear frequency of auctions (only one round per year expected)
- Low reference prices and no minimum prices

The stakeholders' opinion is mainly based on wind power as a core technology. In the end, the realisation rate will also depend on which technologies emerge as winners of the auction.

There is a threat that the 2020 RES targets are not fulfilled considering the expected low realisation rates combined with the postponed introduction of the auction scheme. Referring to Table 2 the NREAP depicts wind power to have the highest deployment between 2015 and 2020. However, the auction scheme is expected to create insufficient incentives for wind in particular. Assuming that wind power can only bid in the pool for capacity factors <0.46 and for installation sizes >1MW, there is a maximum auction volume for wind of

30.9 TWh in the 2016 auction. Assuming an average production of 3600 FLH per year, it can be expected that a maximum of 572 MW of new wind power installation is possible at 100% realisation rate if wind power wins all contracts in the respective pool. This is only slightly above the average annual additional installation of 555 MW which is needed to fulfil the wind deployment targets between 2010 and 2020. It does not leave a large margin for low realisation rates or other technologies to win the auction.

Another critical point in this regard could be that the maximum volume for each auction is stated together with the maximum value this energy can be auctioned for (the total energy multiplied by the assumed average of the bid prices). The volume auctioned for new installations together with the maximum value as stated in Table 5 implies a mean bid price for winning projects of PLN 360.78. Since there are different reference prices applying for the technologies it can happen that the lowest bids sum up to the maximum value but offering less than the maximum amount of contracted energy (e.g. if the whole auction pool for new installations in 2016 will be won by biomass installations >50 MW bidding the reference price, it is only possible to contract 43,336,504 MWh of electricity according to the maximum value). The budget cap could therefore possibly reduce the amount of new capacity when the share of high bids among the auction winners is large. Regarding the reference prices depicted in Table 6 this will happen if all bids will be close to the strike prices since they are all higher than the implied mean bid price of PLN 360.78.

Static and Dynamic Efficiency

The auction scheme as it is designed is very likely to find the least expensive technologies in the market to be supported. This may be achieved through the technology-neutral design and through the rather low reference prices and expected high competition in some of the pools.

However, the dynamic efficiency might be negatively affected since the prices could be pushed to a very low level creating tough market conditions. This way, less mature technologies might not be able to achieve the deployment and market exposure needed for their further maturing, thereby foregoing potential future benefits from new technology developments. Another issue is that very low support levels could make investments in Poland less attractive in the long term compared to other EU countries with higher support.

On the other hand, the sliding premium and tariff structure provides more investment security than the green certificate scheme. All interviewed stakeholders see strong incentives for further reduction of the technology specific costs. This might contribute to increasing dynamic efficiency as compared to the green certificate scheme.

In the auction pool for installations >1MW, competition among technologies with a capacity factor above 0.46 is expected to be rather low as key technologies like wind power and solar PV will most likely not be able to participate in it. Therefore, efficiency can potentially be lower in this group.

Generally, the transaction costs are expected to be moderate and participation in the auction is not seen as a significant additional burden concerning preparation costs.

The total support obtained by a RES installation may not exceed the difference of the specific reference price and the reference competitive market price (URE price) from the year preceding the auction multiplied with the total amount of energy contracted for the period of 15 years. In the case that the market price would decrease more than the inflation rate this can lead to an effective shortening of the support period since the maximum support will have been received already after the production of a lower amount of energy. This can possibly be seen problematic in terms of long term investment security and may be reflected in higher bid prices.

On the other hand the latter point could be used as an effective instrument to influence the amount of existing installations switching from the certificate system into the auction scheme. If it turns out that too many existing installations attempt to switch to the auction scheme therewith destabilising the existing certificate market, previously received support in form of revenues from selling certificates can be to a higher degree deducted from the maximum obtainable support under the auction scheme.

Actor diversity and social acceptability

There are diverging opinions about whether the actor diversity in the Polish energy sector will increase under the new auction scheme. The policy maker argues that the separation of the auction into pools for project sizes of below and above 1 MW will help smaller investors to enter the market. Other stakeholders tend more towards the opinion that the market situation will stay as it is or will become even more concentrated with large state-owned investors. It is expected that large investors will also bid into the pool for small installations with projects at (or slightly below) the 1 MW limit.

In light of this, possible measures for preferential treatment of small actors in an auction are further investigated here. An overview of measures is shown in Figure 1.

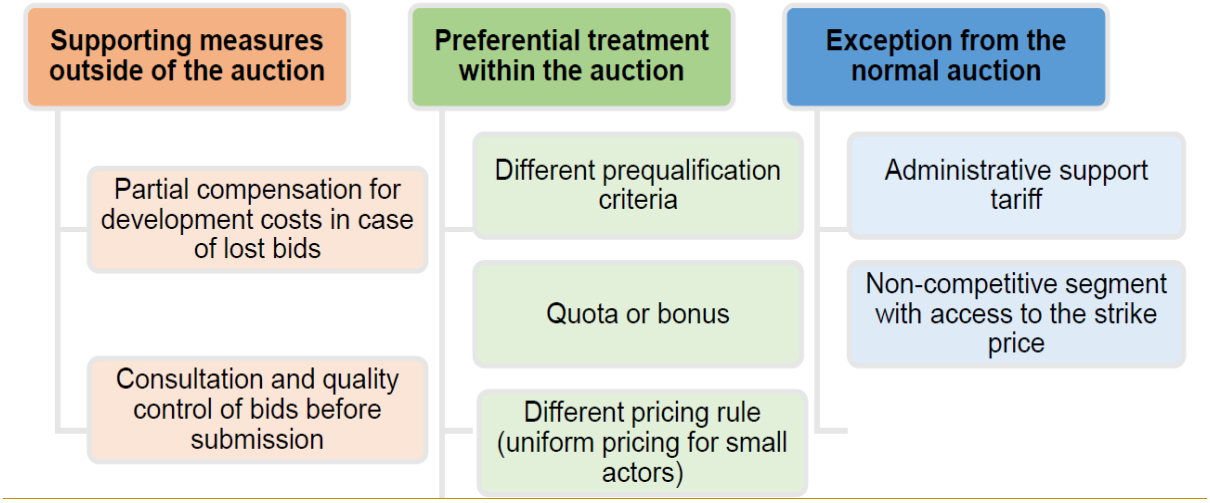

Figure 1: Options for preferential treatment of small size actors (Wigand & Tiedemann, 2016)

The most straightforward option would be excepting smaller actors from the auction altogether, e.g. by using administratively set support levels. This could have been done by exempting small installation sizes of <1MW from the auctions – an option which is explicitly described in the state aid guidelines (European Commission, 2014).

The proposed auction design implicitly uses a project-based definition of small actors, i.e. it assumes that small actors will invest in projects with a smaller size while large investors would prefer projects with large installation sizes. An actor-based definition could help to increase actor diversity without counteracting the effectiveness. This way, e.g. different prequalification criteria or certain bonuses may be introduced to improve the bidding position of small actors in the auction.

One stakeholder suggested strengthening the position of local cooperatives and municipal energy companies by lowering the entry barriers or awarding a bonus on top of the bid price. Both measures would be a preferential treatment within the auction, which would ensure the same level of competition and would therefore not counteract efficiency (Wigand & Tiedemann, 2016).

A strong involvement of foreign actors from other EU countries is not likely since most of the published material is available in Polish language only. Experience from other auctions (e.g. the early offshore wind auctions in Denmark) shows that publication of auction material in English is a crucial point to attract foreign investors (Kitzing & Wendring, 2015).

Compatibility with market principles and integration

The auctioned FiP support ensures a level of market integration which is higher compared to a simple FiT. However, the previous certificate scheme showed a higher degree of exposure to market price signals since they were independent add-ons and not sliding add-ons up to a guaranteed price.

It can be assumed that the volatility of revenues seen by a RES producer will decrease with the introduction of the auctioned FiP. This is perceived as an increase in investor attractiveness by most interviewed stakeholders. However, it is a trade off in terms of market integration due to distortion of price signals as mentioned above.

The incentive to curtail production in periods with negative market prices is not considered to be very strong since the regulation only applies (in the rare case) when the market price is negative for at least six consecutive hours.

Another important change compared to the previous support scheme is the lower degree of freedom in project development from an investor's point of view. The amount of RES to be deployed each year will be determined by the Council of Ministers in ordinances whereas it was previously up to the producers to decide when and how many new projects to develop. Many stakeholders mentioned this as a problematic point; however, one can say that exactly this is a core element of the auction idea featuring constrained volumes and competition.

Distributional effects & minimisation of support costs

The allocation of support is expected to change significantly, away from biomass co-firing and hydro generation to a more equal distribution between different technologies. It can be expected that especially solar PV and wind power will receive a significantly higher share of the total support.

The support payments will be allocated equally to final electricity consumers who will be obliged to pay a RES-fee calculated by the new institution OREO. This is a significant change from the previous scheme which was based on a supplier-based cost recovery. In the existing scheme energy suppliers were obliged to fulfil a quota of renewable energy in their electricity mix by buying certificates or pay a compensation-fee. The costs were then forwarded to their own customers through the electricity bill (CEER, 2015). Therefore, the total burden of support payment was not equally distributed but was depending on the extent to which the different electricity suppliers passed on costs and profits to their customers. The new system is in fact a national socialisation of support costs and should therefore help increasing equality in support financing among electricity consumers in Poland.

The auction scheme introduces a new risk exposure for electricity consumers, since the sliding premium (or contract for difference) compensation is dependent on electricity market prices. If market prices decrease, support payments will increase. On the other hand the support period will be limited in time. In the green certificate system the eligibility was unlimited. This measure can help to decrease the total support payments significantly in the long term. The controllability of the amount of support payments for the policy maker is increased by introducing a cap for obtainable support.

In principle the auction mechanism can give the opportunity to reduce support payments over time along with decreasing technology costs (compare dynamic efficiency) due to the fact that in each auction mainly new installations compete with each other. In contrast, old installations will compete with new installations on a certificate market and could so impact the level of decrease in support payments over time. However, with the limited duration of the auction mechanism of 4 years (2016-2020) as expected by most stakeholders, it is questionable if this effect will be significant.

7 Conclusions

Based on the analysis undertaken it can be concluded that the proposed auction scheme has a high potential to lower the overall support costs needed to achieve the countries environmental policy targets. Furthermore, it may effectively solve the problems which appeared under the previous support scheme based on tradable certificates, namely the dominance of hydro power and biomass co-firing. Moreover, it creates a more stable investment environment making it more attractive for RES project development. This could be further improved by clarification of some important points in the legislation, including the detailed calculation method for the total amount of received support payment (which will be a limiting factor for each project) and the way grid connection issues will be handled.

Concerning the performance of the auction, underbidding is expected to appear by nearly all stakeholders involved in the study. This can seriously counteract effectiveness of the auction and may threaten the achieving of the 2020 targets for RES deployment and emission reduction. Therefore, additional measures should be considered in the auction design to prevent underbidding. These can with benefit be introduced if excessive underbidding appears in the first real auction. Possible measures are for example a higher frequency of auctions to reduce the allocation risk, the introduction of higher penalties in case of total non-compliance or the introduction of minimum bid price levels.

The overall situation of wind power is expected to improve compared to the previous support scheme based on tradable certificates. However, the auction design has some elements that can put wind power in a disadvantageous situation compared to other RES technologies: Onshore wind power can only participate in the auction pool for installation sizes of >1MW, and there is a cap on installations with a capacity factor of less than 0.46. Therefore the accessible volume is considerably small and high competition is expected. In contrast, e.g. biomass technologies have the possibility to participate in all pools. This means that the auction is not really technology neutral in this regard. Offshore wind could potentially compete for the total volume in the pool due to its higher capacity factor; however, it is unlikely to be able to participate at all due to low reference prices and unclear regulation regarding grid connection costs. Overall, it is questionable if the targets for deployment of wind power stated in the NREAP can be achieved if the auctioned volumes in the respective pool are repeated in further auction rounds.

Nevertheless, the overall deployment target for energy from renewable sources may be achieved by other technologies than wind power. Especially the share of solar PV is expected to significantly increase due to a more favourable situation in the auction pool for installations below 1 MW.

A crucial factor for making auctions in Poland successful will be to closely monitor the first auction round and, based on the auction outcome in terms of technology distribution and bid levels, update the volumes of the pools as well as make amendments in the regulation wherever appropriate (e.g. regarding penalty levels, minimum prices or actor protection) on basis of the experiences gained.

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