Report D.4.1-PT, March 2016

Auctions for Renewable Energy Support in Portugal: Instruments and lessons learnt

AURES

HORIZON 2020

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 gives an insight to the characteristics of and lessons learnt with auctions for renewable energy support in Portugal.

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

T4.1 Providing a characterisation of the different auctions

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

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

For further informations please contact Pablo del Rio.

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Auctions for Renewable Support in Portugal: Instruments and Lessons Learnt

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Project deliverable:
WP4 - Empirical aspects of auctions for RES-E: Learning from real experiences.
Task 4.1 Characteristics of auctions
Task 4.2 Assessment of auctions and case-specific lessons learnt

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Table of contents

1. Characteristics of auctions in Portugal

Table 1. Characterisation of auctions in Portugal

Characteristics	Description
Country characteristics	With an installed capacity of 11.5 GW in renewable energy (RE), renewables account for 58% of total power installed capacity in Portugal (hydro 28% / wind 24%), one of the highest shares in Europe. Over the last decade, wind power capacity has increased at a CAGR of 28%, from 500 MW in 2004 up to 4,953 MW in late 2014 (Coutihno, 2015). According to the Renewable Energy Progress Report by the European Commission (2015), the RE share (all sectors) in 2013 amounted to 25.7%, up from 20.5% in 2005, and the country is expected to comply with its 2020 RES target of 31%. The RE trajectory target for 2013/2014 was 23.7%.
Market characteristics	This report focuses on the auctions taking place between 2006 and 2008. The legislative framework of the Portuguese electricity sector was revised in 2006. Prior to this revision there was a dual regime, where the public service sector - regulated by the Energy Services Regulatory Authority (ERSE) and supplied by plants under exclusive PPAs with the transmission system operator (TSO) - coexisted with a fully liberalised segment. Distribution was later unbundled from supply and a last-resort supplier was created, which was obliged to accept any customer who so desired (IEA 2009, p.108). The gradual liberalisation of the Portuguese electricity market was completed in September 2006. Since then, all electricity customers, including households and small and medium-sized businesses have been able to freely choose their electricity provider. Liberalising the power sector increased the number of competitors but, with a market share of 49.6%, *Electricidade de Portugal* (EDP) remained the *de facto* market leader. Additionally, EDP held 30% of the TSO REN, and was involved to a large extent in electricity generation (via CPPE, which was part of the EDP group) (Heer and Langniss 2007). Imports account for 6% of the energy supply, and there is currently a high level of market integration and price convergence with Spain. Portugal and Spain have been integrating their electricity markets into a single Iberian Electricity Market, MIBEL. The market share of the three largest companies in the liberalised market was 85% in 2013. In 2013, Portugal reached its highest switching rate for household consumers: 26.8% compared to 13.2% in 2012 (EC 2014).
Name of auction scheme	Tender for the allocation of wind-electricity capacity in the electricity system network (Original name in Portuguese: *Concurso para a atribuição de capacidade de injecção na rede do sistema eléctrico de serviço público e pontos de recepção associados para energia eléctrica produzida em centrais eólicas*) (DGGE 2005)
Objectives	On March 13 2003, the Council of Ministers *(Conselho de Ministros)* adopted Resolution No.

63/2003, which defines the direction and targets of the Portuguese energy policy. The resolution named three central goals: security of supply, sustainable development and increased national economic competitiveness (IEA 2009).

There are several policy drivers of the scheme, including: environmental targets (GHG emissions reductions), diversification of energy sources, compliance with the indicative RES-E target in the 2010 Electricity Directive, and industrial policy objectives (through the formation of clusters).

When the government invited companies to participate in the tenders, it required that they work with manufacturing companies in order to establish clusters[1] of industries. The aim was to create a manufacturing industry in Portugal. Industry clusters go beyond the "local content" approach since they aim at developing products for export (as well as innovation, and R&D), rather than simply encouraging local manufacturing for in-country projects (IEA 2009).

Contracting authority

Preferred bidders signed a PPA with the government through the Directorate General of Energy and Geology (*Direcção-Geral de Energia e Geologia,* DGEG*),* which is the Portuguese energy regulator under the Ministry of Economics, Innovation and Development.

Main features

This scheme was designed as a multi-criteria auction (or, rather, an auction as part of a multi-criteria decision). Project developers bid for reductions with respect to a reference tariff (set at 74€ / MWh). This tariff was determined under Decree-Law no. 33-A/2005: each of the bid winners gave discounts, which ranged between 5% for phases A and B, to a maximum of 23% for one of the projects in phase C (i.e. a bid of €57 / MWh).

Individual bids were evaluated using a specific credit points system. Tariff reductions weighted 20%, while the development of industrial clusters, the technical management of a project, and its innovation promotion accounted for the rest. Reductions vis-à-vis the reference tariff in the different phases are shown in the table below.

Table. Discount with respect to reference tariff (%).

Auction	Phase A	Phase B	Phase C	Phase C	Phase C	Phase C	Phase C	Phase C	Phase C
When	Oct 2006	Sept 2007	Dec 2008	Dec 2008	Dec 2008	Dec 2008	Dec 2008	Sept 2008	Sept 2008
Discount*	5%	5%	23%	20%	16%	20%	23%	5%	20%

*Price (discount on the reference tariff)

Year of introduction

The scheme was introduced in 2005-2006. There were three phases (rounds): Phase A (2006), Phase B (2007), Phase C (2008). It seems the system has not been revised ever since.

[1] Clusters, or learning networks, are characterized as horizontal networks of firms in which producers deepen their own capabilities by specializing, while engaging in close, but not exclusive relations with other specialists (IEA, 2009)

Technology focus and differentiation	The scheme was designed as a technology-specific auction, where only wind and biomass participate. Hence, there are two bands: one for wind and another for biomass.
Lead time before auction	There were 6 months between the announcement of the auction design and the start of the auction.
Min. / max. size of project	No size restrictions (neither maximum nor minimum).
What is auctioned?	Capacity was auctioned in the three phases: 1,200 MW in 2006 (Phase A), 400 MW in 2007 (Phase B) and 200 MW in 2008 (Phase C). Capacity auctioned in phase 1 was originally 1,000 MW but an additional 200 MW were provided and the winning bidder, EDP, got an extra 20% (200 MW) for “exceptional merit”. The latter could be granted if the project scored at least 75% of the maximum possible score. In Phase C, 200 MW were auctioned distributed in 13 batches of 5-50 MW each.
Budgetary expenditures per auction and per year	This information is not available.
Frequency of auctions	The auctions were organised on an annual basis in 2006 and 2007 and twice a year in 2008 (September and December).
Volume of the tender	In total, 1,800 MW were auctioned in this period, most of them in 2006 (1,200 MW). 400MW were auctioned in 2007 and 200 MW in 2008. It should be noted that the bid evaluation committee was able to award extra capacity if the tender requirements were fulfilled in an extraordinary way and because of exceptional merit of a specific bid (Heer and Langniss 2007). In 2006 the initial volume to be auctioned was 1,000 MW, which was later adjusted to 1,200 MW (1000MW + 200MW).
Auction design elements	See Table 2 below.*

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

Table 2. Design elements for the assessment of auction schemes for RES-E

Design elements	
Single- or multiple-item auctions	The 2006 and 2007 auctions were organised as single-item auctions. The 2008 one was organised as a multi-item auction.
Auction procedure	The auction process was organised as a static auction (sealed bid). Price was one among several other criteria (see below). Producers offered discounts with respect to a reference tariff.
Pricing rules	The pricing rule in this auction was the pay-as-bid (the winning bidder receives the price of its bid).
Ceiling price	The price ceiling is the reference tariff (initial price) on which discounts are offered by bidders.
Qualification criteria	Bidders had to comply with several requirements: • Economic and financial capability, according to a set of pre-defined criteria. • Technical capability, which was presumed if the bidder had 30MW of installed capacity under exploitation when making the submission. Requirements regarding financial guarantees: • €500,000 when submitting the initial documents. If the bidder won the auction, the guarantee was maintained until the contract was signed. • Winners in the bidding procedure had to provide financial guarantees equivalent to 10% of the investment value (which included both the wind farm as well as the associated industrial project). • In Phase C: €10.000 / MW in order to participate in the auction procedure, €25.000 / MW had to be provided by the winners in the bidding procedure (these would free them from the first financial guarantee requirement) (see next section for an explanation of the weights). The project also had to contribute towards the economy (in terms of employment and industry creation). This was not a part of the qualification criteria, but rather assessment criteria in the multi-criteria procedure. Hence, though local content requirements were not part of qualification criteria, they were crucial to win the auction since a high weigh was attached to economic development criteria. A *seller concentration rule* existed*:* Winners in one bidding round were automatically excluded from participating in other rounds.

Penalties	No information on penalties was found.
Monitoring of realisation progress	No information is publicly available on how the project realisation is monitored in order to ensure that sufficient projects are implemented.
Exceptions from requirements for small plants/developers?	There are no exceptions or requirements for small plants/developers.
Different options regarding what is effectively tendered and what is asked for as bids	This is a multi-criteria auction: Bidders can offer reductions with respect to a reference tariff (set at 74€/MWh) but this is only one among other criteria and its weight is very low (only 20%). The reference tariff offered was determined under Decree-Law no. 33-A/2005. Each of the bid winners had given discounts which ranged between 5% for phases A and B to a maximum of 23% for one of the projects in phase C (meaning a bid of only EUR 57/MWh). The evaluation of such proposals had to account for several factors, each with a determined impact (weight) on the final score. Individual bids were evaluated using a specific credit points system. This system established requirements that were to be fulfilled by individual bidding parties. Bidding parties were encouraged to band together in large consortia spanning the entire production and operation process of a wind turbine project. The greatest number of points is granted to bids that would generate the maximum number of local jobs and that would boost local economies. Extra points were given for business strategies that set up enough manufacturing capacity inside Portugal to allow an export of more than half of the produced goods. More specifically, proposals were assessed by means of the following criteria: 1) Increased economic efficiency, in terms of reduced prices for generated electricity from the standard feed-in tariff, described earlier. A discount of 5% compared to the reference FIT for wind power is awarded the maximum number of evaluation credits. 2) Contribution to the development of industrial clusters producing and operating wind turbines. The relevant sub-criteria are: • Direct investments in less developed regions of the country. Investments in the production, assembly and monitoring of mechanical and electronic turbine components are rated higher than corresponding investments in other components. • Indirect investments in less developed regions. • The creation of direct and indirect employment in less developed regions for a minimum period of five years. A differentiation is made according to the specialization of the job. • Direct and indirect gross turnover of industrial clusters.

- Sustainability of the proposed project. This includes the financial, legal and temporal reliability of the project, as well as the projected export volume of industrial clusters. An export of 60 percent of the total production is awarded the maximum number of points.

3) Technical management of the project. The knowledge, experience and technical capabilities of the bidding party concerning the operation and control of a wind farm are assessed. Additionally, the projected power output, the flexibility of the turbines concerning varying grid conditions, and finally, the electricity storage capacities are evaluated.
4) The commitment of the project to promoting innovation in the wind energy sector, e.g., through funding of research and development programmes.

The following table summarises the weighting of these various criteria. In phase B of the tender the same evaluation criteria are applied. Their weighting, however, varies slightly from phase A, e.g. increased emphasis is put on creating industrial clusters.

Table: Weighting of the individual evaluation criteria in phase A of the tender.

Evaluation criterion	**Weighting**	**Sub-criterion**	
1. Economic impact	20 %	Discount to the remuneration of the energy delivered to the grid of wind farms	
2. Creation of an industrial cluster	45 %	2.1. Direct Investment Volume of Industrial Project	11%
		2.2. Indirect Investment Volume generated by the Industrial Project	8 %
		2.3. Direct Employment generated by the Industrial Project	11 %
		2.4. Indirect Employment generated in the Industrial Cluster	8 %
		2.5. Gross added value of Industrial Cluster	7 %
		2.6. Sustainability of the project (project reliability, project stability, export volume)	multiplicative factor to the sub-criteria 2.2
3. Technical management	25 %	3.1. Technical management of the wind farms	10%

of the project		3.2. Technical management of turbine production	2.5 %
		3.3. Energy storage solutions	7.5 %
		3.4. Additional reactive power control	2.5 %
		3.5. Participation of primary frequency regulation	2.5 %
4. Support for Innovation	10 %		

Source: Cravihno et al (2010), Heer and Langniss (2007).

Given the weights of the criteria of this public tender, economic and financial factors were valued at 65%, while the management of the system had a relative weight of 25%. The Portuguese government, through the DGEG, strongly favoured the creation of a cluster of support for the wind sector, trying to attract investment to the country (a weight of 45% was given to the direct or indirect creation of a cluster).

Transferability of support right	The winning bidder cannot transfer his or her support right to another project, sell it to another party or return it, should he or she not be able to implement the project

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

Actor variety and social acceptability

The three phases led to different impacts on the variety of actors. Large consortiums were the winners of Phase A and B (the 1,200 MW of Phase A were won by the ENEOP consortium, the 400 MW in Phase B were won by the Ventinveste consortium). In contrast, the 200 MW were distributed between several small projects in phase C (IRENA-GWEC 2013). Regarding public acceptability, two factors seem to have worked in opposite directions: Not in my backyard (NIMBY) effects due to concentration of wind installations in a few locations vs. the positive impacts on local economic development. The high degree of competition introduced by tendering led to pressure for developers to seek sites with high wind speeds, encouraging concentration of RES in certain locations, leading to a NIMBY syndrome and increasing the hurdles encountered in obtaining planning permissions (Heer and Langniss 2007). But, on the other hand, it should be recalled that in order to minimise the impacts (and opposition) at local level related to the installation of wind farms, Decree No.

225/2007 also provided that 2.5% of the monthly payments to the entity that received the electricity would be paid to the municipality where the wind farm was located (Telha and Gomes 2011).

Policy effectiveness (effectiveness of auctions)

According to the RE-SHAPING project, tendering schemes had a very positive impact on the licensing of new RES-E capacity in Portugal (Winkel et al 2011). The wind capacities tendered in 2005 started to be implemented in 2008 and were expected to be completed in 2014 (Trennepohl et al 2011). Pena (2014) suggests that those wind farms have already been connected. At the time, however, some authors believed that bidders could have overestimated their capacity factors, underestimated their costs and followed strategic behaviour in bidding (i.e., win the bid, then adjust) (Heer and Langniss 2007, Winkel et al 2011).

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

The high degree of competition introduced by tendering led to pressure for developers to seek sites with high wind speeds, encouraging concentration of wind projects in certain locations (Heer and Langniss 2007). However, the recent analysis of Pena (2014) argues that, even though the majority of the wind parks were connected in the windiest regions (Center and North), the static efficiency of the scheme was not high since the sites with the best wind resources were not selected due to several reasons:

i. *Information system:* At the time the first licensing requirements were published, there was very little information concerning wind speed distributions with high resolution. Only general charts were available and there was a total absence of local wind information.

ii. *Geographic system:* At the time the licensing requirements were published, there was little availability of land for wind developments, mainly because:

a. Land owners were naturally sceptic with the introduction of a new technology.
b. The process of negotiating land was very complex, as there were many owners for a given parcel of land and grid connection might need to pass across several parcels.
c. There were not electrical network connections to the best places, as the network was orientated away from mountains and closer to load centres. Even in cases where network lines existed, connection capacity restricted the available sites for wind.
d. There were environmental restricted areas. The average percentage of protected areas in NUTS III[2] regions (i.e., groups of municipalities) is 8.5%, ranging between 0 to 53.5%.

iii. *Economics:* At the time the licensing requirements were published, the projects were economically viable regardless the wind resource. Public tenders required that projects had to be submitted in a short time span. There was no time and/or information to assess the trade-off between increasing electricity production in windier regions and investing in longer and more expensive grid extensions. Thus, it became more important

[2] The Nomenclature of Territorial Units for Statistics (NUTS) is developed by Eurostat, and employed in Portugal for statistical purposes. NUTS III correspond to Portugal's 25 sub-regions.

to have a land license in a region close to an existing connection point rather than find a place with the best wind conditions.

One of the most important selection criteria was the development of a wind industrial cluster. This did not guarantee that the sites selected by the wind developers were optimal, but that the chosen developers had the economic capability of creating a large industrial investment. On the other hand, price for wind and biomass was lower than the previous FIT, with a discount of between 5% and 23% the reference tariff. Support has been reduced over time with tenders. However, the design of the scheme does not seem to promote competition leading to lower bids. A 5% discount in prices offers the maximum number of credit points during the evaluation of the bids, impeding any attempt of reducing the price beyond this limit (Heer and Langniss 2007).

Dynamic efficiency

The auction only promotes wind and, more modestly, biomass. Therefore, the impact on technological diversity, a main component of dynamic efficiency, is quite limited. On the other hand, the impact of this multi-criteria auction on innovation is unclear, but support for all the stages of the supply chain might have benefited local innovation.

Compatibility with market principles and integration

The awarded support was in the form of a FIT which, as it is well-known, is less electricity market compatible than other alternatives (FIPs and quotas with TGCs).

Distributional effects & minimisation of support costs

The fact that prices for wind and biomass tenders were lower than the previous FIT would have positive distributional impacts on electricity consumers vs. wind generators. The local economic development requirements (see below) can be expected to have positively affected some regions and stakeholders. But this has probably come at a cost in terms of smaller reductions in support.

According to Winkel et al (2011), there was a positive impact on the number of new jobs and the industrial development resulting from the construction of the new farms, mostly as a direct consequence of the characteristics of the tendering procedures, i.e., the incentive for the formation of industry clusters.

The consortium was projected to spend a total of €1.7 billion by 2011; that constitutes one of the most significant foreign investments in renewables in Portugal's history. The investment would support the development of 48 new 20-25 MW wind parks in Northern and Central Portugal that would supply some 2.3 million households with electricity. Roughly one quarter of the total annual electricity produced from wind in the entirety of Portugal would be supplied by these wind parks. Besides the installation of the wind projects, the consortium would construct seven wind turbine manufacturing facilities. The project additionally envisaged the development of an industrial facility in Viana do Castelo with a planned total surface area of 135,000m^2, a production capacity of 180 (ENERCON) wind turbines/year and 600 towers/year. Siemens was expanding its

Portuguese transformer production to meet the additional demand. More than 60% of their total production is planned to be exported after 2011.

3. Lessons learnt: key best practices and pitfalls identified

- This scheme was one of the first experiences in auctions for RES in Europe and worldwide. Therefore, policy learning from other schemes was unlikely. It is unclear how the design elements in this scheme have influenced the design of auctions elsewhere.
- The discounts on a reference FIT (the one existing in the year prior to the introduction of the scheme, i.e., in 2005) was quite original at the time, and may have inspired the design of the recently introduced Spanish auction scheme (which implements a discount on the existing remuneration, although not for operation but for investment).
- The case study suggests that in multi-criteria auctions, trade-off among different assessment criteria are likely, but a balance can be struck between them.
- In particular, the scheme seems to have been quite successful in creating a local industry and local jobs. The local economic development criteria may have reduced local opposition and NIMBY effects and speeded up the administrative process (i.e., making easier to obtain the required administrative authorisations). But, on the other hand, this may have come at a cost in terms of not achieving the lowest possible bids and, thus, support costs.
- It is, however, important to notice that not only the existence of the multi-criteria auction, but the way it was designed may have led to this trade-off. In particular, there seems to be an imbalance between both criteria (support costs and local economic development criteria). Bid prices only weighted 20% and, in addition, the highest score in this criterion could be achieved if a 5% reduction on the reference tariff was proposed, which removed the incentive to offer reductions beyond that percentage. Therefore, it is highly likely that higher reductions of support could have been achieved under both a single-criteria auction and under a multi-criteria auction with a greater weigh for bid prices.
- There are indications of other trade-offs: between static efficiency and geographical diversity, between static efficiency and NIMBY, between static efficiency and local economic development and between dynamic efficiency and support costs.
- The absence of good electricity grid connections to the best places (together with other factors) was a barrier for the deployment of projects in the best places, leading to a suboptimal outcome in terms of static efficiency.

References

- *Coutinho, G (2015). Portuguese RES Support Scheme. Portuguese government. Energy Community - RES Coordination Meeting. Vienna, 27-28 April 2015*
- *Cravinho, A., Cunha, R., Oliveira, C. (2010). Public-Private Partnerships for Wind Power Generation: The Portuguese Case. Center of Urban and Regional Systems Technical University of Lisbon*
- *The Directorate General of Energy and Geology (Direcção-Geral de Energia e Geologia), (DGGE) (2005). Concurso para a atribuição de capacidade de injecção na rede do sistema eléctrico de serviço público e pontos de recepção associados para energia eléctrica produzida em centrais eólicas (In Portuguese) (www.dge.pt).*
- *EC (2014). Country reports. Portugal. https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_portugal.pdf*
- *European Commission (2015). Annex to the Renewable energy progress report {SWD(2015) 117 final}.*
- *Heer K, Langniss O. (2007). Promoting Renewable Energy Sources in Portugal: Possible Implications for China. Centre for Solar Energy and Hydrogen Research Baden-Württemberg, Stuttgart.http://www.resource-solutions.org/pub_pdfs/Heer.and.Lagniss.Portugal.Study.pdf*
- *IEA (2009): Energy policies of IEA countries. Paris.*
- *IRENA-GWEC (2013). IRENA-GWEC: 30 YEARS OF POLICIES FOR WIND ENERGY, 111.117.*
- *Peña, I. (2014). Retrospective and prospective analysis of policy incentives for wind power in Portugal. Submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Engineering and Public Policy. Carnegie Mellon University Pittsburgh, PA. August, 2014.*
- *Telha, J. 2014. Expert evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013. Task 1. Policy paper on renewable energy and energy efficiency of residential housing. Portugal. A report to the European Commission Directorate-General Regional Policy.*
- *Trennepohl, N., Binda Zane, E., Brückmann, R., Piria, R., Herling, J., Bauknecht, D. (2011). Integration of electricity from renewables to the electricity grid and to the electricity market INTEGRATION National report: Portugal. Client: DG Energy.*
- *Winkel, T., Rathmann, M., Ragwitz, M., Steinhilber, S. Winkler, J., Resch, R., Panzer, C., Busch, S., Konstantinaviciute, I. (2011). Renewable energy policy country profiles. Based on policy information available in March 2011. Intelligent Energy Europe RE-SHAPING project. www.reshaping-res-policy.eu*