D2.2-HU, June 2020

Auctions for the support of renewable energy in Hungary

Main results and lessons learnt

AURES II has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817619

D2.2-HU, June 2020, Auctions for the support of renewable energy in Hungary

Authors: Mária Bartek-Lesi, Bettina Dézsi, Alfa Diallo, László Szabó, András Mezősi (REKK)

Reviewed by: Mak Dukan (DTU), Ana Amazo Blanco (Navigant), Barbara Breitschopf (Fraunhofer ISI)
Submission date: M20
Project start date: 01 November 2018
Work Package: WP2
Work Package leader: REKK

Dissemination level: PU (Public)

Contents

1 Introduction

In November 2019 Hungary conducted its first pilot auction for renewable energy support and announced the results in March 2020.

The auction was successful in providing information on current technology prices and driving down support costs, borne exclusively by non-household consumers in Hungary. Albeit the auction was announced as technology-neutral, all the awarded projects are PV installations except for one small-scale landfill gas power plant.

This report provides an overview of the evolution of the Hungarian support scheme and renewable deployment, and presents the main design features and the results of the pilot auction. Developers competed in two size categories to gain support to produce 200 GWh/year, up to a maximum budget of HUF 1 billon EUR 2.9 million. Altogether, 168 bids were submitted representing 349 MW capacity, 269.4 MW of which belonged to projects eligible to participate in the auction, which means the auctioneer managed sufficient level of participation.

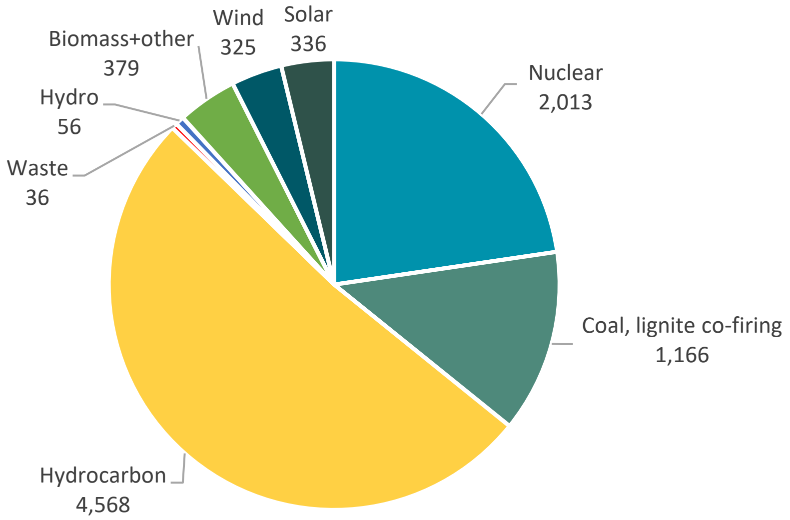
Although recent increase of the Hungarian exchange rate, coupled by the volatility in the electricity and foreign exchange markets induced by the COVID-19 pandemic might affect the implementation of the winning projects, the national regulatory authority expects to connect 131.84 MW renewable capacity to the grid which would meet its objective.

The structure of the paper is the following. Chapter 1 provides a brief overview of the electricity sector, followed by the description of the main pillars of the Hungarian support scheme and the status of deployment of different renewable technologies in Chapter 2. The key design elements and characteristics of the renewable auction are outlined in Chapter 3. Chapter 4 presents the main outcomes of the auction, which are evaluated in more detail in Chapter 5. The final section concludes by summarizing lessons learned and how they can be applied to improve the Hungarian auction system in the future.

2 Overview of the Hungarian electricity system

Thermal power plants using fossil fuels have the largest share (65%) of installed generation capacity in Hungary, although their share has declined over the last 10 years. Paks nuclear power plant represents almost a quarter of total generation capacity, growing 7% over the last decade. The share of hydro facilities and wind capacities were constant in recent years meaning that solar PV plants mainly led the increase in renewable energy capacity.

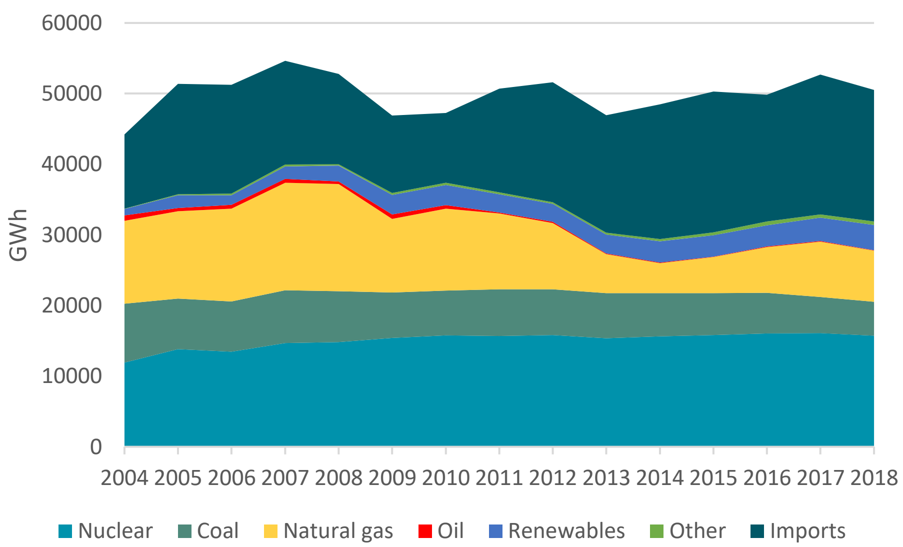
Figure 1. Installed generation capacities by fuel in 2018, MW



Source: Hungarian Energy and Public Utility Regulatory Authority (MEKH), 2018

Overall Hungary's domestic electricity generation declined moderately with imports taking on a larger role. This is driven by lower utilization of natural gas and coal fired facilities. Volume of nuclear generation remains constant, so its share compared to the overall domestic generation is increasing, reaching 50% of the domestically generated electricity in 2018. Renewable sources provide a growing but still small part of domestic generation.

Figure 2. Hungarian electricity generation mix and imports



Source: International Energy Agency, 2020 (own elaboration)

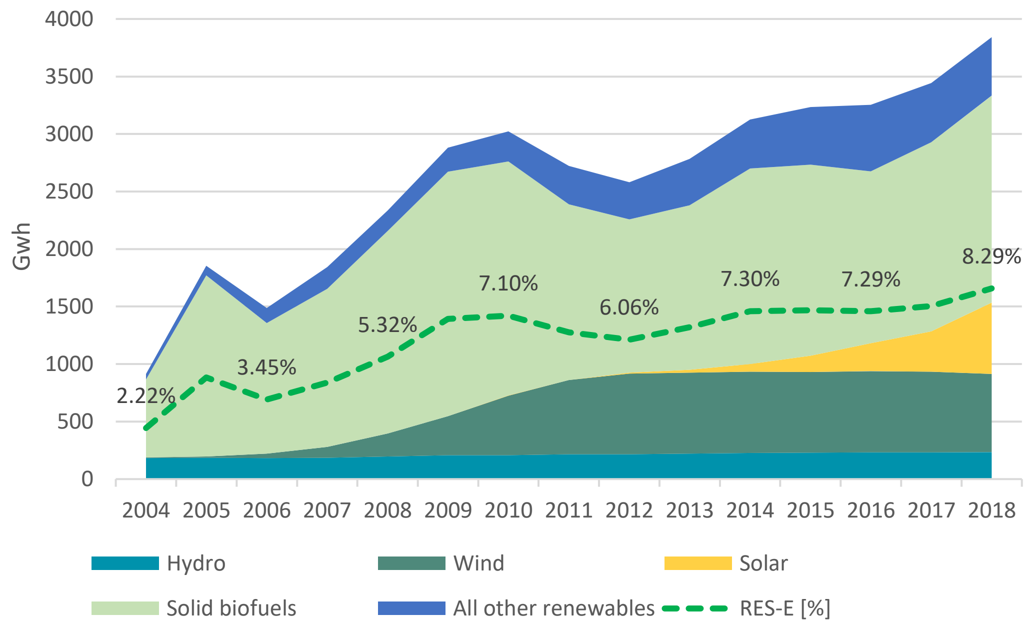
3 Main pillars of the Hungarian support policy

The Hungarian renewable energy sector follows binding EU legislation. The Renewable Energy Directive of 2009 set 13% overall renewable target for 2020, which was already reached by 2011 owing to a revision of biomass accounting. Hungary increased the target voluntarily to 14.65% in its Renewable Energy Action Plan[1]. The level of gross final energy consumption which is strongly influenced by exogenous economic and weather (demand for heating) factors largely determines the share of renewables. In 2018, Hungary's heating sector used nearly six times more renewable energy than the electricity sector. Owing to weather variability and additional economic factors (e.g. price increase of biomass resources) the share of renewables fell below 13% in 2018. (SHARESs, 2020; Bagi, 2019)

The evolution of renewable electricity production and share of the electricity sector is shown in the following figure. After joining the EU in 2004, when RES-E amounted to very small shares of hydro and biomass, Hungary set a target of 3.6% by 2010. It met and exceeded the target thanks to the feed-in tariff subsidy system, launched in 2002 and operating until 2017. However, this scheme mainly incentivized coal and biomass co-firing in already existing power plants which had a very important role in reaching the 2010 target

Hydro remains constant across the time horizon and wind has reached the upper boundary in the respective regulatory system for reasons described in section 2.2. The other renewables category on the next figure consist of gaseous and liquid biofuels, renewable municipal waste and geothermal energy. Until recently solar energy had a small share in electricity generation, but in the last two years PV capacities started to grow rapidly.

Figure 3. Renewable based electricity generation and the share of renewables in the electricity sector



Source: SHARES (2020)

[1] Hungarian Natonal Renewable Energy Action Plan, 2010-2020, https://2010-2014.kormany.hu/download/6/b9/30000/RENEWABLE%20ENERGY_REPUBLIC%20OF%20HUNGARY%20NATIONAL%20RENEWABLE%20ENERGY%20ACTION%20PLAN%202010_2020.pdf

3.1 Support scheme design

Leading up to EU accession, Hungary introduced a feed in tariff scheme in 2002.

The level of FIT was determined to exceed the direct and external costs of non-renewable electricity production and was differentiated for peak and off-peak periods which was considered an advanced approach for dispatchable renewable generation (biomass, biogas) at that time. The FIT level varied per unit and technology. One visible result of the introduction of FIT tariff, complemented with the EU air pollution legislation was that many power plants firing lignite and coal switched partly or completely to biomass firing.

Up until 2008 renewables enjoyed positive discrimination by exemption from production scheduling obligations. Even after change in regulation, the margin of tolerance remained at high levels undermining the incentives to schedule effectively. In the second half of the decade the support scheme was changed to find a more cost-effective way to reach 2020 targets, also the above-mentioned positive discrimination against renewables has been eliminated.

An important factor influencing profitability in the sector is that all power generators in Hungary pay an extra corporate income tax of 31% on profits, in addition to the normal corporate tax rate. Renewable based electricity generation is exempted from this additional payment.

The Renewable Energy Support Scheme (METÁR) launched in 2017 was developed according to EU guidelines. The new system kept the mandatory FIT system exclusively for units below 0.5 MW and for demonstration projects of any size (METÁR-KÁT). Installations from 0.5 to 1 MW can apply for a feed-in-premium in addition to the market price, and over 1 MW the support level is set through competitive auctions. For existing biomass and biogas power plants the 'brown premium' system supports operation through an ex-post subsidization based on returns. Otherwise once expired, in the absence of any support, these power plants would have likely switched back to coal or ceased operation. The brown premium helps to maintain favorable conditions under the mandatory takeover system by subsidizing these plants with the difference of their production costs and the market price or with the difference of the price of coal and biomass.

Table 1. Renewable support scheme in Hungary

Name of support scheme	Mandatory takeover (METÁR-KÁT)	METÁR premium scheme		
		Green premium		Brown premium
Procedure and beneficiaries	New entry under 500 kW and demonstration projects	Without tender 500 kW – below 1 MW	With tender 1 MW and above and wind (independent of size)	Existing solid biomass, biogas
Type of support	*Feed-in-tariff* Set by government, adjusted with CPI	*Feed-in-premium* Premium = Supported price (set by government) - reference market price	*Feed-in-premium* Supported price is a result of tendering. Premium = supported price - reference market price	*Feed-in-premium* Regulator sets the supported price which is the sum of reference price and the brown premium, B) Regulator determines the premium

Source: Varga (2017)

3.2 Summary of wind installation developments

Construction of wind installations was subject to quantitative limitations from the very beginning because of system adequacy and network integration constraints. The Hungarian Energy Regulator (MEKH) set the cap for wind capacity at 330 MW in 2006, therefore the subsequent call for wind capacities attracted nearly fivefold subscriptions for permits as promoters considered this as the last option to get license for wind installations. Less than half of the applications became eligible and were rewarded on a pro-rata basis, so project promoters were rewarded with proportionately reduced permits for 51% of their targeted capacities. This reduction had a negative effect on the profitability and the economies of scale of these projects (Tóth et al., 2011). The limitation on capacities also resulted in the emergence of a secondary market of permits. (Pató et al., 2018).

The 2007 Electricity Act was quite progressive and defined tenders as the process to acquire licenses from 2008 for wind generators for which quota limitation was extended. In 2009 the first tender for wind capacity was announced for 410 MW new capacity. The capacity limit was exceeded by nearly threefold and several applicants applied for very low or zero subsidization. Even so the tender was abruptly withdrawn a year later. In 2016 very strict rules were adopted limiting the size, capacity and noise pollution as well as the distance rule to settlements, which effectively resulted in a ban on wind development. At the moment, prospects for wind remain bleak since the Renewable Energy Action plan anticipates only the existing 330 MW by 2030. This means that today's working capacity generating some 700 GWh annually since 2011 is not expected to grow in the next decade. In 2018 wind energy amounted to 18% of RES-E or1.5% of overall domestic generation. Additionally, the FIT support for these wind power plants will expire in the next decade, so it is questionable whether they will continue to operate on a market basis.

3.3 Solar capacities

Support of solar PVs in Hungary was different from the European mainstream where FIT levels were continuously adjusted to falling technology costs. In Hungary the mandatory feed-in-tariff was initially set at a low level and was only adjusted with the consumer price index which meant very low profitability in the beginning, attracting very low interest. However, its attractiveness increased over time when the falling technology costs approximated the nearly constant FIT level. The announcement of the end of the mandatory takeover system and the introduction of a new, and expectedly less favorable support system resulted in a last minute rush for licenses under the old FIT system. Until the end of 2016, when the mandatory takeover FIT scheme was withdrawn, the Regulator had accepted support requests for 2000 MW capacity (mostly facilities under 0.5 MW), as there was no pre-determined cap on the possible application. Out of the 2000 MW application almost 25% has been built until April 2019. Projects that were technically approved had two years to begin operation, but a change in the regulation extended the implementation deadline by 3 years with very favorable conditions (Bagi, 2019).

4 Characteristics of RES-E auctions in the country

The first Hungarian auction was held between 4th November and 2nd December 2019 and the results were announced in late March, 2020.

Being the first of its kind, it was only a pilot tender with a relatively small offered volume and budget. By design the auction was technology neutral, which means, that all renewable technologies were able to participate without separation into technology baskets. However, in practice the tender functioned more like a multi-technology auction because of additional legal restrictions that limited some technologies. As mentioned above, Hungary has very strict regulations for wind power plants that are prohibited within 12 km radius of any residential area, which practically makes it impossible to build new wind power plants in Hungary (253/1997 Governmental Decree).

The tender was designed as a static, pay as bid, two sided[2] sliding feed-in premium auction with simultaneous volume and budget constraints. A total of 200 GWh/year of supported energy were offered (which is equivalent to approximately 150 MW of solar PV capacity), but support was limited to 1 billon Hungarian Forint (HUF) (equivalent to3 million EUR) annually. New renewable power plants and existing renewable power plants with retrofits worth more than 50% of their original investment value could participate, if their size was within the range between 0.3 MW and 20 MW capacity.

Due to economy of scale effects in tenders where there is no separation based on size, larger power plants tend to hold an advantage over small scale plants. In order to support the development of these smaller plants, the auctioneer[3] created two separate baskets, one for small power plants below 1 MW and another for plants having 1 MW capacity or more. One third of the total auctioned volume and budget were assigned to the small-size, while two thirds to the large-size category. However, the support period (15 years), the realisation time (3 years), and the ceiling prices (78 EUR/MWh) were the same in the two baskets.

Table 2.: Main characteristics of auctions and framework conditions

Characteristics	Description of the auction
Characteristics of the national electricity market	In 2018 the Hungarian electricity consumption is dominated by nuclear power generation (35%) and imports (32%). Its short-term electricity market is coupled with Slovakia, Czech Republic and Romania. The power exchange of the country is called Hungarian Power Exchange (HUPX), while derivatives are traded on Hungarian Derivative Energy Exchange (HUDEX).
Name of auction scheme	Support for electricity production from renewable energy sources through auctioned premium system (in Hungarian: Megújuló energiaforrásból termelt villamos energia támogatása pályázati zöld prémium rendszer keretében)
Contractual counterparty	The organiser of the auction is the Hungarian Energy and Public Utility Regulatory Authority (MEKH). The provider of the support is the Hungarian TSO (MAVIR). The support is mainly financed by electricity consumers, not part of universal service (generally universal service is equivalent with household customers).

[2] Producers must return excess revenues when the market price is higher than their support price.
[3] Ministry for Innovation and Technology

Main features	Static Pay-as-bid (PAB) auction. Hungarian auction design includes a 20% requirement for cross-border auction in the period 2017 - 2026, however for the pilot tender only companies and Hungarian municipalities with projects within the Hungarian borders could participate. Consortia were not allowed to enter the tender. In the auction new renewable power plants and existing renewable power plants with retrofits worth more than 50% of their original investment value could participate.
Technology focus and differentiation (eligible technologies)	Technology neutral auction (all technologies can participate). However, because of the restrictions with respect to wind deployment in Hungary (253/1997 Governmental Decree), wind power plants were not able to participate.
Lead time before auction	The auction procedure was published on 2nd of September 2019 (2 months before the start of the auction) and was updated in 28th of October. Bidding period: From November 4th, 2019 to December 2nd, 2019. Announcement of successful tendering procedure: March 6th, 2020 Publication of results: March 27th, 2020
Min./max. size of project	The minimum size limit on the auction was 0.3 MW, while the maximum was 20 MW. The auction was organised into two separate baskets based on size: small installations with a capacity between 0.3 MW and 1 MW and large installations between 1 MW and 20 MW.
What is auctioned?	Auctioned item: MWh of energy injected into the grid by the planned renewable power plant. The tender supports altogether 200 GWh/year of energy, which is divided between small and large power plants the following way: small size – 66 GWh/year large size – 134 GWh/year For the auction a budget of 1 billion Hungarian forint (HUF) (approximately 3 million EUR) was allocated in the following way: small size – 333 million HUF (approximately 1 million EUR) large size – 667 million HUF (approximately 2 million EUR)

Budgetary expenditures per auction and per year	A total budget of 1 billion HUF was allocated for the first auction in Hungary. Budgets and exact timing of the future auctions are unknown.
Frequency of auctions	Undefined
Volume of the tender	Supported energy: 200 GWh/year, auctioned budget: 1 billion HUF (3 million EUR)
Costs related to grid connection/access	Producers bear the cost associated with grid connection and a 50% reduction can be secured for the connection cost, but it is deducted from rewarded tariff. (13/2017. (XI. 8.) Decree of the Hungarian Energy and Public Utility Regulatory Authority of Hungary)
Balancing and profile costs	Producers are responsible for the scheduling and payment of deviations. The associated cost is assumed to be 8-10 EUR/MWh, according to market participants.

Table 3.: General auction design

Design elements	Description
Auction format	Multi-unit auction
Auction procedure	Price-only, static auction. Bidders with the lowest price offers win the right to complete the project as long as either the supported energy limit or the available budget limit is not reached. In the case of equal bids brown-field projects are ranked better, and if both are brown-field, the project with bigger capacity wins. If these criteria are not sufficient to select the winners, the bid submitted earlier is prioritised.
Pre-qualification requirements - Financial	In order to participate, the bidder must present a bid bond of 1.5% of its investment cost based on the capacity of the power plant. Calculation of the investment cost is based on a unit benchmark cost presented by the regulator. The form of the bid bond must be a bank guarantee. Winning projects must pay a 5% performance bond based on calculated investment cost (so additional 3.5% relative to bid bond) based on its capacity and a unit benchmark investment cost presented by the regulator. The performance bond must be a bank guarantee.
Pre-qualification requirements - Material	Beyond the deposit of a guarantee, the interested parties must submit information concerning the technical specifications of the power plant, the company (ownership structure) and about other benefits (like investment supports) received Applicants also have to submit a letter of intent by the grid operator specifying the planned point of connection.

	Awarded bidders must in addition submit or fulfil these requirements • 'Small power plant operation licence' (above 0.5 MW) • Network connection contract • Building permit • Certificate of commencement of commercial operation
Auction volume	200 GWh/year (66 GWh/y for small size, and 134 GWh/y for large size power plants)
Pricing rule	Pay-as-bid (PAB)
Award procedure	Static, sealed bid auction for the supported price (in HUF/kWh). Support is awarded to bidders with the lowest offers until either the volume or the budget constrained is reached.
Price limits	The ceiling price was the same for all technologies in both baskets, 26.08 HUF/kWh (78 EUR/MWh)
Support period	15 years but can be reduced if the power plant receives additional types of support.
Favourable treatment of specific actors	There is a separate basket within the auction for small size power plants with capacity less than 1MW.
Realization time limit	36 months
Penalties	If a promoter announces it cannot complete the project within 6 months from the announced auction results, it gets back 15% of the performance bond. If the promoter has a building permit and a network connection contract after 6 months of the auction results, 30% of the performance bond is released (payed back). If these documents are presented within 6 months, then the 30% release is not applicable, in order not to take advantage of 15% deduction rule presented in the previous point. If the project is not completed in time, the promoter loses the performance bond. If the project is not completed at most 1 year after the deadline, then it loses its right for support and the promoter cannot participate in renewable auctions for 3 years. If the producer changes its site of operation after winning the right to complete the project in the tender, the awarded price is reduced by 1 HUF/kWh (3 EUR/MWh).
Form of support auctioned	Two-sided sliding feed-in premium

The method of reference wholesale price calculation	Ex-ante reference price: The yearly reference price is calculated as the monthly unweighted average of the future peak load (for PV) or baseload (for other technologies) prices for the next three years converted to Ft/kWh. This reference price is used to calculate if the support budget is constrained or not. Ex-post reference price: For every month, the average hourly price of HUPX. In the case of PV power plants, it is adjusted with the production profile of the PV power plants.
Support level adjustments	The support level is indexed yearly with the monthly average of consumer price index of Hungary adjusted by a -1% efficiency factor.
Transferability of support right	Non-transferrable.
Other	Power plants using the same source of energy with connection points located within 1000 meters should be considered as one power plant with a capacity of the sum of the separate power plants. The calculation has to take into account power plants not participating in the auction but receiving support through the METÁR system. The aggregated capacity determines in which size category the projects will compete. Projects with the same owner cannot be awarded more than 15 GWh/year of supported energy in the small size category and 50 GWh/year in the large size power plant category.

Two features of the auction design are worth analysing in further detail.

First is dividing the auction according to size. Creating separate auction baskets according to plant size increases the chances for smaller more expensive projects which is a priority of the Hungarian government. However, there are financial risks associated with this design especially when the difference between the prices of small and large power plants is large (Diallo el al., 2018). An alternative way to support smaller projects is to grant them a price advantage under a merged auction, which should eliminate those with significantly higher prices from the competition and reduce aggregate support costs. The downside is that more efficient large scale power plants may adjust their prices upward if the level of competition is not sufficient. Furthermore, if the price advantage is mismanaged, it may grant an unfair advantage to either small or large scale power plants.

Second is the rather unique aggregation rule that pools all power plant capacity with a connection point of less than 1 km. In this aggregation process all power plants already connected to the grid are considered, in addition to those that have not yet been built but have an assigned connection point, and also those, which are participating in the ongoing auction. For example, two power plants with equal capacity of 0.8 MW located within 1 km would register as a combined 1.6 MW capacity in the auction and compete in the large auction basket instead of the small sized one. In some instances, this can also disqualify a sponsor if the aggregation increases its capacity beyond the 20 MW threshold.

The motivation behind this rule is to protect against recurring fraudulent activities. Capacity fragmentation is a method for sponsors to divide large scale solar projects into smaller units to benefit from better financing conditions of the support scheme. The ownership structure of a project could be manipulated in a similar way, so even projects with different owners are bound by the rule.

The strict regulation prevents capacity fragmentation but carries a downside. First, prospective project promoters might not receive accurate information about the location of other participating projects in the auction, which can push a well-intentioned small size producer into the large auction basket or even out of the auction. Clearly this is not in the spirit of the policy goals of the auction since reassignment to the large basket eliminates the desired advantage for small projects and exclusion usually leads to a suboptimal resource allocation.

Problems associated with the aggregation rule can emerge even in case all promoters have full information about all project locations of the auction. It could occur that because of strategic considerations, a promoter is not incentivised to place the power plant at the best place available. Assume a promoter with a project of 0.4 MW planned capacity finds a prime location enabling a bid of 65 EUR/MWh, but another bidder is planning to build a 2 MW project within 1000 m. In this case if the original project promoter expects a winning price to top out at 70 EUR/MWh in the small and 60 EUR/MWh in the large category, he/she is incentivized to move to a less suitable location requiring a higher price to remain in the small basket, and be able to win in the tender. In this sense the aggregation rule can lead to allocation inefficiency.

5 The outcome of the pilot auction

As mentioned above, applicants were invited to bid for support in two size categories. Altogether, 168 bids were submitted representing 349 MW capacity and 119 projects were eligible to participate representing 269.5 MWh. The number of disqualified projects was relatively high (30%), especially in the smaller size category, mainly due to invalid or missing information in the tender documentation, failure to comply with the deposit of bid bonds in the form of bank guarantees, and late submission. This likely means that investors found the administrative procedure too complex, but the experience gained should contribute to a smoother application process in the next auction rounds.

After selecting the eligible projects and applying the aggregation rule in 16 cases, 74 companies competed in the small-size category totalling 77.6 GWh annual generation, 1.2 times the amount to be awarded (66 GWh), while in the „large" size category 45 companies offered 313.7 GWh, 2.3 times more than the 134 GWh to be supported. Thus, the overall rate of oversubscription was 1.96. The total capacity of installations deemed eligible for participation made up 269.5 MW out of the 349 MW capacity of submitted applications. Of these, 43.3 MW from the small category and 88.5 MW from the large category were selected (adding up to 131.84 MW). Albeit the auction was announced as technology-neutral, all participants applied with PV installations, except for one landfill gas power plant. This is mainly due to above mentioned legal restrictions imposed on wind plants practically displacing wind technology.[4]

The next table presents the main results for the two size categories.

Table 4: Main results of the Hungarian Pilot Auction, 2019

	Size category	
	0,3-1 MW	**1 - 20 MW**
Minimum bid price, EUR/MWh	63.50	60.51
Weighted average bid price, EUR/MWh	74.32	64.98
Highest price accepted, EUR/MWh	77.70	68.15
Highest bid price, EUR/MWh	78.12	77.88
Preliminary market reference price, EUR/MWh	69.60	69.60
Ceiling price, Ft/MWh	78.12	78.12
Amount of capacity accepted, MW	43.34	88.51
Annual generation, GWh/year	65.59	127.45
Estimated cost of support, '000 EUR	464.55	-287.90
Number of winning projects	61	11

Source: Auction results published by MEKH and REKK calculations[5] . Note: Euro values are calculated using the average HUF/EUR exchange rate for the period 04.11.2019 – 02.12.2019, based on MNB data[6].

As the table shows, the difference in weighted average and the highest accepted price between the two size categories is close to 9 EUR/MWh. Using the auction results published by the authority, we calculated the expected level of annual support for winning projects based on their bid prices, projected annual generation values, and the indicative reference price laid down in the announcement note of the auction (69.6 EUR/MWh) . For small installations under 1 MW the received annual support requirement is EUR 465,548, and for larger installations above 1 MW it is EUR -287,901. The negative value for larger installations is a result of several bidders submitting prices below the 69.6 EUR/MWh indicative reference price. It is important to note, however, that this reference price, is based on the average physical futures peak prices of the preceding 3 months which was higher than the same values in previous years: 57.36 EUR/MWh in 2018 and 57.01

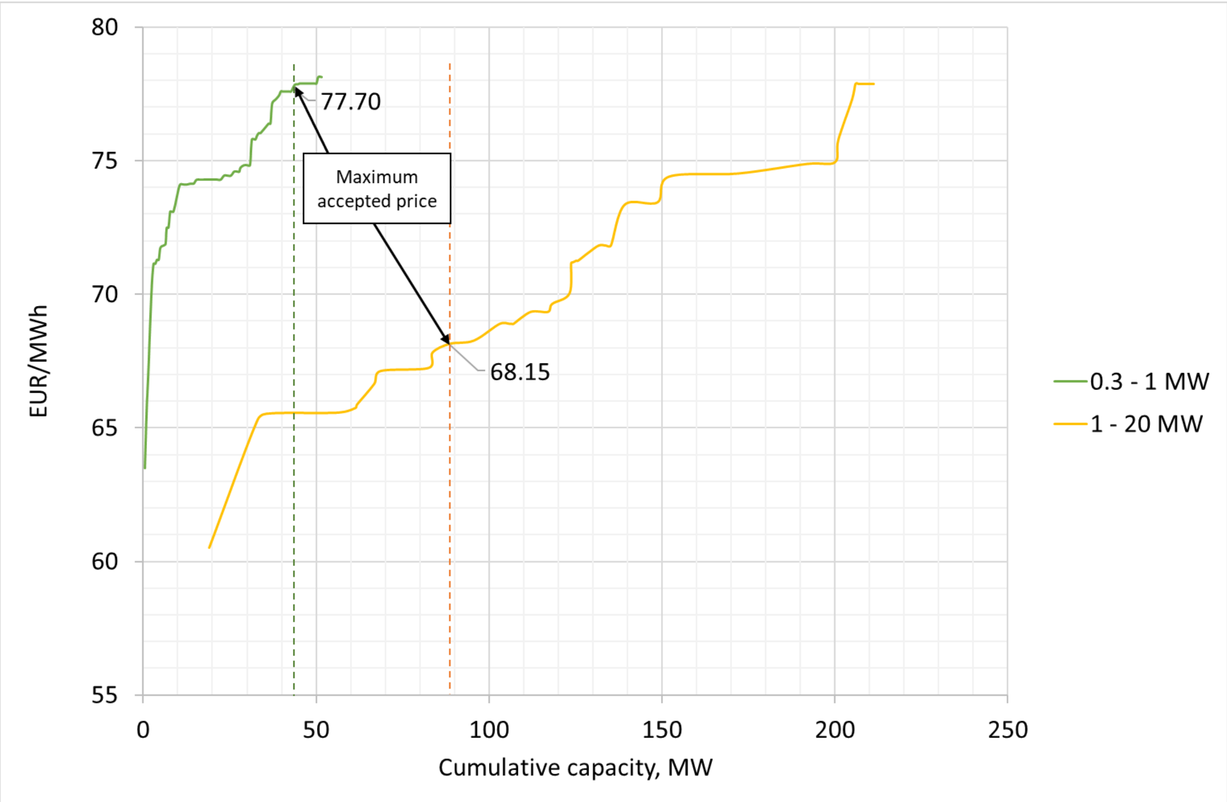
[4] Péter Kotek: From where does it blow? On the regulation of wind turbines in Hungary, REKK Policy Brief, September, 2016 https://rekk.hu/research-paper/54/from-where-does-it-blow
[5] http://mekh.hu/a-2019-es-metar-palyazat-eredmenyhirdetese
[6] Hungarian National Bank, https://www.mnb.hu/arfolyam-lekerdezes

EUR/MWh in 2019, suggesting that the actual premium payments might be somewhat higher.

Nevertheless, if we compare the calculated annual support requirement (EUR 176.648) to the maximum levels originally anticipated for the two baskets (maximum EUR 997.484 and EUR 1,997.963, totalling EUR 2995.447), the auction resulted in annual savings of approximately EUR 2,818.799. In case the auction will turn out to be effective in terms of realization, this huge difference in support costs suggests that the former, administratively determined FIT was too high compared to the real levelized cost of projects, and the auction was successful in generating competition and gaining more accurate information on development costs.

The next figure shows submitted bids and corresponding capacities for both baskets.

Figure 4: Cumulative capacities and bid prices at the Hungarian renewable auction



Source: REKK figure based on the auction results published by MEKH[7] Note: Euro values are calculated using the average HUF/EUR exchange rate for the period 04.11.2019 – 02.12.2019, based on MNB data[8].

Prices offered across the two baskets overlap, with the difference between the lowest bids only 3 EUR/MWh. The highest bids were capped by the ceiling price, set at the same level for both categories. To see whether it would be sensible to merge the two baskets in the next auctions, hypothetical results of a pooled auction are analysed in the following section.

Overall, the pilot auction revealed that the actual costs of PV generation are well below the previous feed-in tariff level which should create substantial savings in support costs. The next subchapters look deeper into the important assessment criteria that shaped the pilot auction.

[7] http://mekh.hu/a-2019-es-metar-palyazat-eredmenyhirdetese

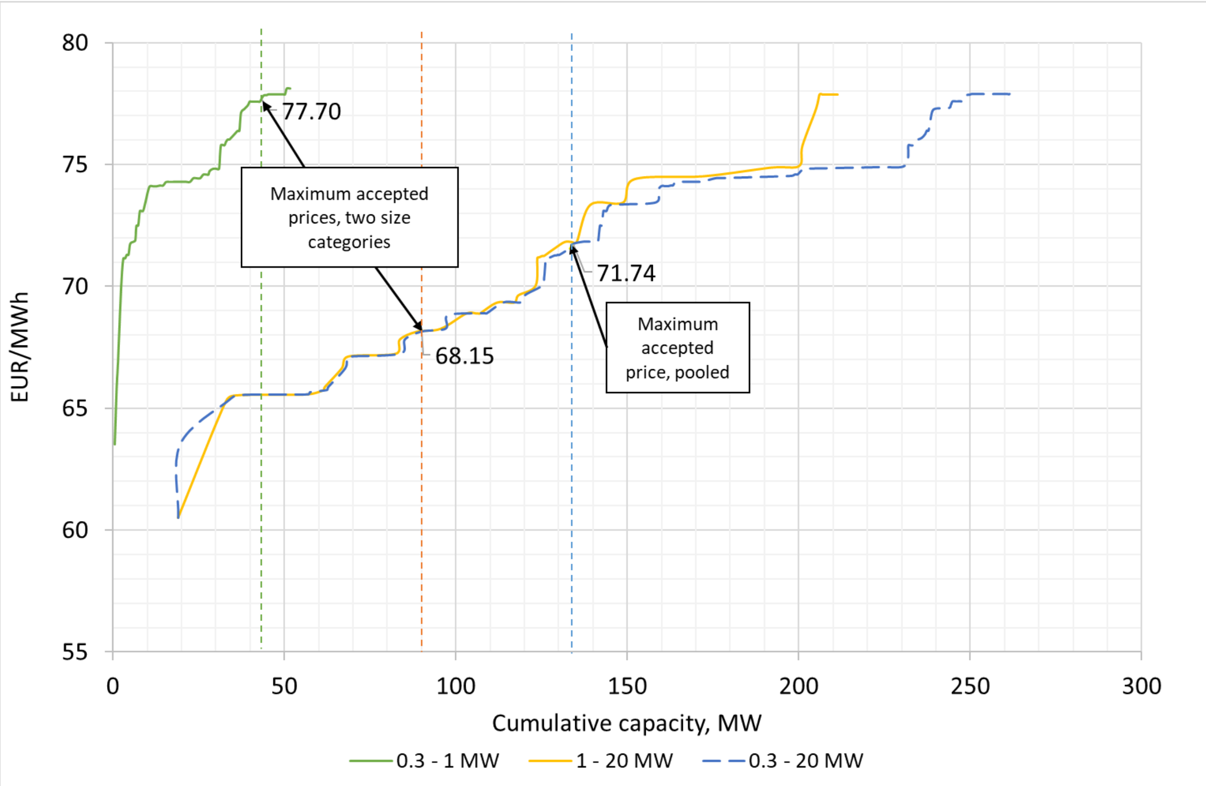
[8] Hungarian National Bank, https://www.mnb.hu/arfolyam-lekerdezes

6 Evaluation of the auction

6.1 Actor variety and the role of size categories

Although the Hungarian RES-E auction was planned as technology neutral, support was gained almost exclusively by PV projects, due to the above mentioned regulatory restrictions discriminating against wind installations. To provide more opportunity for smaller projects the auction was split into two plant size categories having separate auction procedures with the same ceiling price. To observe the effect of this division, outcomes from a hypothetical scheme with all installations pooled into a single basket auction was compared to the results of the actual two basket auction. The following figure compares the outcomes.

Figure 5: Single vs Two Basket auction results



Source: REKK figure based on the auction results published by MEKH[9] Note: Euro values are calculated using the average HUF/EUR exchange rate for the period 04.11.2019 – 02.12.2019, based on MNB data[10].

As expected, large projects would have fared well due to their more favourable economies of scale. The highest accepted bid would be 6 EUR/MWh below the highest price of the small size category. The next table compares the results of the single basket auction with the same values calculated for the actual auctions.

The weighted average price of the pooled auction (66.6 EUR/MWh) falls between the prices achieved in the small and large size categories (74 EUR/MWh and 65 EUR/MWh) and would be 1.6 EUR/MWh lower than the weighted average across both baskets. The capacity receiving support (134.18 MW) would slightly exceed the total amount actually awarded (131.84 MW), adding 6 GWh annual production and resulting in EUR 173.5 thousand less support cost.

[9] http://mekh.hu/a-2019-es-metar-palyazat-eredmenyhirdetese
[10] Hungarian National Bank, https://www.mnb.hu/arfolyam-lekerdezes

Table 5: Results of the two-basket and the single basket (pooled) auctions

	Two-basket auction, total	Single basket auction
Weighted average price, €/MWh	68.15	66.56
Capacity receiving support, MW	131.84	134.18
Estimated RES-E generation, GWh	193.03	197.96
Estimated cost of support, thousand EUR	176.65	3.07
Number of winning projects	72 (61 small, 11 large)	36 (10 small, 26 large)

Source: REKK calculation based on the auction results published by MEKH[11] Note: Euro values are calculated using the average HUF/EUR exchange rate for the period 04.11.2019 – 02.12.2019, based on MNB data[12].

Although these results show that merging the two baskets would probably lead to lower prices, only 10 small-sized projects would be awarded instead of 61, and 15 more large plants would be selected. Furthermore, the single non-PV project - the 0.5 MW landfill-gas plant - would fail to receive support, eliminating any diversity of technology. Another case against the pooled auction is that 'discriminatory' auctions dividing bidders into separate categories might theoretically reduce overall support expenses by applying the principles of third-degree price discrimination. (Erhart et al. 2017, Mora et al. 2017).

As was mentioned, the aggregation rule was applied to prevent large PV systems to gain an unfair advantage from dividing into smaller capacities. The rule, described in more detail in the auction design section of our study, aggregates the capacity of all renewable power plants which are part of the METAR system, and their connection point is located within 1 km. In the auction system we highlighted two main channels through which aggregation rule can affect the auction. First by changing the bidding behaviour of potential participants, and second through the reclassification of participating projects to another size category. The first behaviour cannot be evaluated according to the auction results but conclusions can be drawn from reclassification.

As a result of the aggregation rule one participant was disqualified from the auction for totalling more than the 20 MW maximum size limit. The initial bid capacity was 20 MW but it was located within 1 km of a small size (less than 0.5 MW) PV power plant receiving support from METÁR-KÁT. In the end this did not affect the auction results because the price offer was too high.

More importantly there were 16 projects that applied for support as small-sized plants but as a result of the aggregation rule were reclassified into the large size category. Eight of these projects would have received support in the small basket but only one did in the large basket. Nonetheless, the effects across the whole auction were minimal.

To conclude, the aggregation rule did not significantly affect the results but we still advise its reconsideration. It might change bidding behaviour and can result in suboptimal bidding. Even if it affects a low number of participants, it may punish developers, independently from their own decision. If more independent power plants choose the same location, they can be reclassified to the larger capacity category or in worse case can be excluded from the auction.

6.2 Cost efficiency

The pilot auction revealed that feed-in tariffs above EUR 100/MWh in the past were not reflective of actual costs in Hungary. As shown earlier, the competitive procedure can result in an estimated EUR 2,818.78

---

[11] http://mekh.hu/a-2019-es-metar-palyazat-eredmenyhirdetese

[12] Hungarian National Bank, https://www.mnb.hu/arfolyam-lekerdezes

thousand savings compared to the previous FIT system though the weighted average price is still relatively high in comparison with other EU member states. In the 2019 Polish auction, small basket project prices (below 1 MW) were similar to Hungary (EUR 74.4 versus EUR 74.3) while large basket project prices were substantially lower (EUR 48.7 compared to EUR 65 in Hungary).[13] The most important difference was the viable and competitive presence of wind projects in Poland. The Greek auction resulted in EUR 57 average price according to the results announced in April 2019[14], while the 2019 German auction organised for wind and PV projects resulted in a weighted average price of EUR 54.7 per MWh, won exclusively by solar projects.15

Hungarian renewable project developers claim that balancing costs are higher in Hungary than other European countries, reaching 8-10 EUR/MWh. In Germany it is closer to 2 EUR/MWh. This cost is influenced by many factors and difficult to predict but could partially explain the differences in bid prices. As regards the minimisation of support costs and distributional effects, lower support costs will be beneficial for the non-household sectors currently financing the support scheme in Hungary.

Available support through the auction was limited by capacity and financing for both size categories, whichever is first exhausted. Since the support budget was lower than expected, the quantity limit became effective. Setting two boundaries makes sense for pilot auctions where information on generation costs is not available and the required support is uncertain.

Investors made three observations related to the auction. Most criticised the long time for announcing the final results by the authority, which they considered unreasonably long. Some would like to extend the upper size limit beyond 20 MW. Many believe that because attractiveness for developers is strong larger amounts of electricity should be auctioned.

6.3 Effectiveness of the auction

The auction can be considered effective in terms of delivering the planned amount auctioned, generating high interest among developers. However, the realization of the winning projects can be undermined by the recent increase in the HUF/EUR exchange rate. Influenced by the COVID-19 pandemic, the Hungarian Forint (HUF) has fallen in value relative to the EUR and USD since the launch of the tender, pressuring developers that bid HUF and pay a high proportion of costs in EUR or USD. A higher exchange rate will increase the costs for investors that did not manage their currency risk properly and put some winning projects at risk. It is also a question how the pandemic might affect the supply of PV panels in global markets.

Amidst the exchange rate uncertainty, winning developers must deposit their performance bonds within one month after the award decision. The number of winners placing performance bond will provide a first signal on how the recent changes in exchange rate influence the financial viability of projects.

Although not directly related to the effectiveness of the current auction, an important issue influencing the successful implementation of future auctions is the limited hosting capacity of the Hungarian distribution network.[16] According to the interviews made with RES-E plant developers, in lack of available grid connection

---

13 Based on figures published by the Polish Energy Agency, cited in Diallo (2020) Nem fújnak a szelek Magyarországon, https://metazsul.blog.hu/2020/04/17/nincsujszel

14 https://renewablesnow.com/news/greece-awards-4378-mw-in-renewables-auction-juwi-secures-almost-half-651695/

15 https://www.pv-magazine.com/2019/04/18/solar-once-again-the-only-winner-in-german-renewables-auctions/

16 Hungarian DSOs publish maps on their websites showing the avaible grid connection points for RES-E plants, and update them periodically. See for example: https://www.eon.hu/content/dam/eon/eon-hungary/documents/kiseromuvek-csatlakozasi-lehetoseg/EDE_eromu.pdf

capacities some investors have no other option than building lines and substations by themselves and thus provide for their point of connection at their own expense.. However, all these network elements will belong to the property of the DSO. [17] In order to ensure equal opportunities to all RES-E projects in auctions, it is important to improve the electricity system and ensure just allocation of grid connection capacities,

[17] Interview with the representatives of RES-E developers

7 Summary - Lessons learnt

- The first Hungarian auction can be considered successful: compared to the former support system, it significantly improved the efficiency of support allocation and revealed that project developers will accept lower prices. However, winning prices remain higher than in other European countries, partly reflective of higher balancing costs.

- Bids for the large-size category were more than double the auctioned capacity and about 20% higher for the small-size category. The smaller rate of oversubscription in the small size category was mainly due to the high share of disqualifications. The quality of applications should improve as bidders gain experience and confidence in the process. Another reason for the small bidding rate might be that the ceiling prices were set equally across the two size-categories. Several small projects bid the ceiling price while large projects tended to bid lower, suggesting ceiling prices should be differentiated. According to our results, pooling the separate auctions could bring about further support cost reduction assuming similar bidding strategies, but the number of small projects gaining support would fall significantly, which might negatively affect public acceptance.

- Wind technology could have improved competition and reduced support costs, but strict regulations precluded their involvement in the tender.

- The estimated support cost is much lower than the level previously predicted based on the administratively set feed-in tariff (which served as a ceiling price in the auction). However, the indicative reference market price to which bids are compared to assess the projected premiums is quite high compared to the annual averages seen in the market. Thus, participants might have had lower price expectations and submitted lower bids and negative premiums (2 projects in the small and 4 projects in the large-size basket). Actual premiums will depend on monthly reference wholesale prices calculated ex-post.

- The effectiveness of the auction can be influenced by the evolution of the HUF exchange rate which has fallen about 10% to the EUR and USD since the announcement of the auction. If it persists, some developers might reconsider paying the performance bonds, and would see their investments in financing risks, as most investment costs would be paid in Euro, but the premium would be paid in HUF.

- One unique feature of the Hungarian auction is the aggregation rule. As explained previously, the capacities of those plants which connected to the grid within a distance of 1 km were added up, and could compete in the relevant size category accordingly, irrespective of the owner of the plants. Although the application of the rule had no significant effect on the results, as the transfer of 16 such projects to the large-size category only raised prices by 1% in the small-size auction. The rule probably kept some large scale applicants from splitting up their capacities as intended (as smaller projects face more relaxed licensing process and lower administrative costs), but can still result in suboptimal locational decisions or deter some developers from bidding previously planned projects located close to other projects. It is also possible that independent small-scale producers failed to access support after transferring into the large-size category.

- This pilot auction already shows that Hungary will soon face the issue of limited network access for new RES producers, and the allocation rules of existing connection points should also be improved. One possible solution is to speed up the development of the distribution grid and the connection points available under a well-designed territorial distribution. Currently DSOs have limited capacity to construct connection points and allocate them efficiently which causes significant problems for prospective RES developments in Hungary, negatively affecting future auctions.

- The low level of bid bond (1.5% of investment costs) in combination with the long period between bidding and announcement of results might affect the realization rate negatively, as developers might not pay the performance bond if they see negative trends during the time period between the bidding and result announcement phase, currently staying at 7 months. E.g. negative developments in the exchange rate could deteriorate their NPV and they can step back from the project.

- The regulatory agency (MEKH) intends to announce a credible timetable for future auctions, however no specific timing for the next auctions has been announced yet. MEKH plans to hold two rounds annually in order to achieve national RES targets. Although the planning and implementation of renewable auctions is a learning-by-doing process and improvements can be expected in the administrative procedures, the lengthy 7-month process for the pilot auction leave little room for adjustments in time for next auctions.

References

Bagi A. (2019). A METÁR támogatási rendszer. REKK presentation, Budapest, 12 April 2019

Diallo et al. (2019) Auctions for the Support of Renewable Energy in Poland, Main results and lessons learnt, D2.1, Aures Project, August, 2019, http://aures2project.eu/wp-content/uploads/2019/08/Polish-Auctions_final.pdf

Ehrhart, K. M., Haufe, M.C & Kreiss, J., (2017) Discrimination in Auctions for Renewable Energy Support: Three Theoretically Equivalent but Practically Different Concepts http://games.econ.kit.edu/img/EhrhartHaufeKreissDiscriminationInAuctionsForRES2018.pdf

Hungarian Energy and Public Utility Regulatory Authority - MEKH (2018): A magyar villamosenergia rendszer 2018 évi adatai, p 42., http://mekh.hu/download/6/de/b0000/a_magyar_villamosenergia_rendszer_2018_evi_adatai.pdf

International Energy Agency – IEA (2020): Data and statistics, https://www.iea.org/data-and-statistics?country=SLOVAKIA&fuel=Energy%20supply&indicator=Electricity%20generation%20by%20source

Matthäus, D. (2020) Designing effective auctions for renewable energy support, Energy Policy, Vol. 142, July 2020, 111462

Mora, D. et al. (2017) Auctions for renewable energy support - Taming the beast of competitive bidding, Final report of the AURES I. Project, D 9.2, http://auresproject.eu/sites/aures.eu/files/media/documents/aures-finalreport.pdf

Pató Zs., Bartek-Lesi M., Kácsor E., Kaderják P., Mezősi A.,& Szabó L. (2018). Renewable Energy in the Member States of the EU, Chapter 12 – Hungary. In Fouquet, D. (Ed.), EU energy law Volume III. Deventer: Claeys & Casteels.

SHARES (2020) : SHARES database of Eurostat. https://ec.europa.eu/eurostat/web/energy/data/shares

Szabó L.& Varga K. (2020) The key to further successful renewable energy auctions in Hungary, REKK Policy Brief, April, 2020 (in Hungarian)

Steinhilber, S and E. Rosenlund Soysal (2016) Secondary objectives in auctions, Policy Memo 1, October 2016 Aures I. Project, http://auresproject.eu/sites/aures.eu/files/media/documents/policy_memo_1-_secondary_objectives_251016.pdf

Tóth P., Bulla M. & Nagy G. (2011). *Energetika*. Digitális Tankönyvtár, https://www.tankonyvtar.hu/hu/tartalom/tamop425/0021_Energetika/ch04s03.html

Varga K. (2017) : Változások a hazai és nemzetközi megújulóenergiaszabályozásban, http://www.megsz.hu/megsz/images/stories/2017-honlap/Nap-2017/1_Varga_Katalin_-_MET%C3%81R.pdf

Other resources

Interviews with renewable electricity plant developers

Interview with the representative of the Hungarian Ministry for Innovation and Technology

Interview with the representative of the Hungarian Energy and Public Utility Regulatory Authority (MEKH)

On-line workshop of the REKK Foundation: 'Results of the Hungarian pilot RES-E auction', April 7, 2020

AURES II is a European research project on auction designs for renewable energy support (RES) in the EU Member States.

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

www.aures2project.eu

AURES II has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817619