



On the way to efficiently supplying more than half of Turkey's electricity from renewables:

Opportunities to strengthen the YEKA auction model for enhancing the regulatory framework of Turkey's power system transformation

About SHURA Energy Transition Center

SHURA Energy Transition Center, founded by the European Climate Foundation (ECF), Agora Energiewende and Istanbul Policy Center (IPC) at Sabancı University, contributes to decarbonisation of the energy sector via an innovative energy transition platform. It caters to the need for a sustainable and broadly recognized platform for discussions on technological, economic, and policy aspects of Turkey's energy sector. SHURA supports the debate on the transition to a low-carbon energy system through energy efficiency and renewable energy by using fact-based analysis and the best available data. Taking into account all relevant perspectives by a multitude of stakeholders, it contributes to an enhanced understanding of the economic potential, technical feasibility, and the relevant policy tools for this transition.

Authors

Ayşe Ceren Sarı and Değer Saygın (SHURA Energy Transition Center). Hugo Lucas (Factor Energy) contributed to the report as consultant.

Acknowledgements

We appreciate the valuable review and feedback received from Utku Ünal, Batur Yenmez and Yalçın Altuntaş (Borusan EnBW); Ezgi Deniz (Enerjisa), Yiğit Erzan (General Electric); Faruk Telemcioğlu (International Solar Energy Society – Turkey Section, GÜNDER); Viktoriya Kereleska (PowerWind Europe); Volkan Aktürk (Sanko Energy); Cihan Kaçar (Tekfen Holding); Gokhan Kalayli (Turcas Petrol); Gülşah Altıkulaç (Turkish Wind Energy Association, TÜREB) and experts of the Deloitte Energy and Natural Resources team. Selahattin Hakman and Philipp Godron (Agora Energiewende) of the SHURA Energy Transition Center also provided their valuable review and feedback to the report. An earlier draft of the report was reviewed in a stakeholder consultation meeting that took place on 3 October 2018 in Istanbul.

SHURA Energy Transition Center is grateful to the generous funding provided by the ECF.

This report is available for download from www.shura.org.tr.

For further information or to provide feedback, please contact the SHURA team at info@shura.org.tr.

Design

Tasarımhane Tanıtım Ltd. Şti.

Print

Nar Baskı Merkezi

Copyright © 2018 Sabancı University


ISBN 978-605-2095-44-7

Disclaimer

The interpretations and conclusions made in this report belong solely to the authors and do not reflect SHURA's official position.

**On the way to efficiently supplying
more than half of Turkey's electricity
from renewables:**

Opportunities to strengthen the YEKA
auction model for enhancing the
regulatory framework of Turkey's power
system transformation





CONTENTS

List of Tables	4
List of Figures	4
Abbreviations	5
Executive Summary	7
1. Introduction	13
2. The status quo of policy mechanisms supporting renewable energy capacity deployment in Turkey	15
YEKA auctions	15
Other policy mechanisms	19
YEKDEM	19
Local content incentive (feed-in premium)	20
Support for land acquisition	20
License fee reductions	20
Investment mechanisms	20
3. Methodology	21
4. Performance assessment of YEKA auctions and YEKDEM	25
Performance assessment of YEKA auctions	25
Effectiveness	25
Efficiency	26
Socio-economic impacts	27
Performance assessment of YEKDEM	28
Effectiveness	29
Efficiency	30
Socio-economic impacts	30
5. Assessment of YEKA auction model benchmarked against international best practices	31
6. Recommendations for future YEKA Auctions	41
References	44
Annex A: Guiding survey questions	47
Annex B: Stakeholder meeting minutes	48
Annex C: Worldwide distribution of auction design elements	51

LIST OF TABLES

Table 1: Status of YEKA auction design elements, as of December 2018	16
Table 2: YEKDEM tariffs for different energy technologies (excluding feed-in premiums for local content)	19
Table 3: The criteria used in performance assessment of YEKA auctions and YEKDEM	21
Table 4: Definitions of YEKA auctions' key model elements	22
Table 5: Assessment of YEKA auction model benchmarked against international best practices	31

LIST OF FIGURES

Figure 1: Cumulative installed capacity of wind and solar in Turkey, January 2007 - December 2017	29
Figure 2: Worldwide distribution of auction design elements	51

ABBREVIATIONS

AURES	Assessment Criteria for RES-E Auctions
CO ²	carbon dioxide
ct	cents
EPDK	Energy Market Regulatory Authority
ETKB	Ministry of Energy and Natural Resources
GW	gigawatt
kW	kilowatt
kWh	kilowatt-hour
MW	megawatt
PPA	Power Purchase Agreement
PV	photovoltaic
R&D	Research and Development
RES-E	Electricity from Renewable Energy Sources
TEİAŞ	Turkish Electricity Transmission Corporation
TWh	terawatt-hour
US\$	United States dollars
VAT	value added tax
YEKA	Renewable Energy Resource Areas
YEKDEM	Support Mechanism for Renewable Energy Resources



Recent developments in Turkey's renewable energy sector and its regulatory framework

Turkey is on the verge of transitioning its energy system, and today's investment choices will determine tomorrow's energy landscape. Turkey's urgent policy priority is to reduce its current account deficit that is largely impacted by growing energy imports. Energy efficiency and local renewable energy resources have paramount importance in eliminating the dependency on imported gas and coal. To accelerate the adoption of local renewable energy resources, Turkey has implemented a mix of policy mechanisms. **Most recently, in 2017, "Renewable Energy Resource Areas" (Yenilenebilir Enerji Kaynak Alanı, YEKA) auctions were introduced. YEKA auctions resemble the well-known market-based "auction" policy mechanism that is being increasingly implemented worldwide.** YEKA auction model is preceded and currently complemented by a portfolio of other policy mechanisms to accelerate renewable energy investments in Turkey. These policy mechanisms are the feed-in tariff mechanism and pre-licence auction model that have been used since 2005 and 2011, respectively.

The first round of YEKA auctions was held in 2017. Two of 1 gigawatt (GW) size capacity were awarded to two distinct consortiums consisting of national and international partners. Projects received record-low prices below the 2017 global average, awarded at US\$3.48 ct/kWh for onshore wind and US\$6.99 ct/kWh for solar photovoltaic (PV). Following the success of the 2017 YEKA auctions, the government announced three new YEKA auctions in 2018. This second round involves one YEKA auction for onshore wind with a total capacity of 1 GW (4x250 MW), one YEKA auction for solar PV with a total capacity of 1 GW (500 MW, 300 MW, and 200 MW), and one YEKA auction for offshore wind with a total capacity of 1.2 GW. The second onshore wind YEKA auction will take place in 2019. The second solar PV YEKA auction was planned to take place in the end of January 2019, but is recently canceled. The offshore wind YEKA auction that was initially planned for October 2018, is postponed to earliest 2019. According to the Ministry of Energy and Natural Resources' (Enerji ve Tabii Kaynaklar Bakanlığı, ETKB) new plans, an additional 10 GW of solar PV and 10 GW of wind capacity will be installed in the coming decade.

Turkey's YEKA auction model can be distinguished by its objectives: developing local manufacturing capacity, technology transfer, and creating a competitive domestic market for low-cost renewable energy. YEKA auctions will play a pivotal role in operationalising the government's commitment to increasing the country's renewable energy capacity.

YEKA auction model is a recent development, yet Turkey has a history of policy mechanisms that support electricity generation from domestic renewable energy resources, which also incorporate auctions for connection capacity utilisation rights. Turkey's feed-in tariff model "Support Mechanism for Renewable Energy Resources" (Yenilenebilir Enerji Kaynakları Destekleme Mekanizması, YEKDEM) defines tariff levels for different technologies. Beneficiary projects benefit from this policy mechanism for 10 years once they are in operation. Projects with capacities of over 1 MW are subject to a licenced renewable energy generation model, and should apply for pre-licensing for connection capacity. Pre-licence auctions are carried out in cases

where there is more than one request for connection capacity. In 2011, wind project developers were awarded pre-licenses for a total connection capacity of 2,122 MW. Pre-licence auctions took place for 3 GW of onshore wind and 600 MW of solar PV in 2017 and 2015, respectively. An additional 2 GW connection capacity for onshore wind energy was announced, and to award this new capacity a wind pre-licence auction is planned for April 2020.

While all countries aim to benefit from the declining costs of renewable energy technologies, international experiences show that renewable energy auction models depend on national circumstances, such as Turkey’s underlying motivation driven by an industrial strategy. The record-low 2017 prices in Turkey are promising. Costs of renewable energy technologies have significantly declined in Turkey, in accordance with the global trend. In addition, the planned capacity additions through YEKA auctions somewhat indicate a continuation of what Turkey has achieved under the YEKDEM system in terms of renewable energy capacity installations. YEKDEM system will continue to commission connection capacity until the end of 2020. During the period when the capacity installations was limited to YEKDEM only, a total of almost 7 GW of onshore wind was installed by end of November 2018, and 5 GW solar PV (2023) target was reached by the same date. This is equivalent to around 13.6% of the total annual electricity generation capacity of all resources. In terms of electricity output, wind and solar energy currently covers a moderate share of just above 9% of the total. Considering what many other countries have achieved with similar or even less resources, this share will increase in the coming years as Turkey starts utilising more of its local resources.

Benefitting from global experiences and stakeholder views to enhance YEKA auctions

According to SHURA’s grid integration study released in May 2018, titled “Increasing the Share of Renewables in Turkey’s Power System”¹, the transmission grid in Turkey can integrate a share of wind and solar energy as high as 30% by 2026—if planning starts today. When combined with the output from other renewable energy sources, half of all electricity output can be supplied by renewable energy by 2026.

Achieving such ambitious targets requires a total installed capacity of 60 GW wind and solar energy by 2026. SHURA is preparing a series of papers to provide the pathway to reach this capacity target. The first in the series, titled “Balancing the Location of Wind and Solar PV Investments”², was released in October 2018. This second paper provides a perspective on a future regulatory framework that employs YEKA auctions.

International experiences show that auctioning can be an effective tool if processes are carefully crafted to ensure that the needs of investors from various segments are considered and the most cost-effective projects are rewarded. The uniqueness of auctions as a regulatory policy mechanism, lies in their agility. The global experience in auction design is increasing and participating private companies have endured a fast learning curve. As anywhere else in the world, Turkey’s auction design will improve, benefitting from its own experience and the global experience at large. This process is particularly important, as YEKA auctions were received with mixed feedback from investors, despite their success in attracting

¹ <https://www.shura.org.tr/increasing-the-share-of-renewables-in-turkeys-power-system/>

² <https://www.shura.org.tr/4128/balancing-the-location-of-wind-and-solar-pv-investments/>

very low bids. The main concerns included the lack of regularity, the consequences of single-item auctions on the diversity of market players, and financing constraints. The government proactively addressed these concerns by adjusting some of the design elements before the new YEKA auctions were officially announced in 2018. However, the consensus is that the effectiveness of design elements can be enhanced.

This paper, prepared in close collaboration with Turkey's energy sector stakeholders, investigates in which areas and how YEKA auction design can be further developed. A trilateral approach was used for this purpose: (i) a comprehensive literature review was carried out to identify policy mechanisms for wind and solar PV installations in Turkey and a methodology to assess the performance of YEKA auctions; (ii) the gaps in Turkey's auction design elements were identified through a comparison of corresponding experiences in 29 other countries,³ based on a methodology that was developed for the European Commission;⁴ and (iii) stakeholder views and recommendations were collected through a survey based on assessment of individual components of YEKA auctions. The auctions were reviewed together with the stakeholders across 18 design elements: Regularity/periodicity, Authority responsible for the auction, Power purchase agreement (PPA) & object of auction, Technology, Site, Project size, Auction type, Ceiling prices, Requirements, Guarantees, Local content requirements⁵, Selection criteria for winning bids, Establishing the final price, Penalties, Policy mechanisms, Information and transparency, Financing opportunities, and Processes. In addition to these design elements from the YEKA auctions that were held in 2017, this paper also assesses the new onshore wind YEKA auction to be awarded in 2019, the new solar PV YEKA auction which was planned to be carried out in January 2019 and is recently canceled, and for offshore wind YEKA auction that was recently postponed earliest to 2019.

Priority areas to enhance YEKA auctions in efficiently supplying more than half of Turkey's electricity from renewables

Assessment outcomes point to nine priority areas suggested for improvement of the YEKA auction design on the way to increasing the share of renewable energy in Turkey. The suggestions provided in this report will assist Turkish government's rapidly evolving policy making process for realising the most cost-effective auction design and regulatory framework that will create a long-term sustainable renewable energy industry capable of meeting the demands of Turkey's growing energy market, as well as the markets beyond Turkey's borders, so that the country is strongly positioned in the regional and global competition. The recommendations will foster the already dynamic learning process among energy sector actors and enhance the regulatory framework in a way that is most suitable for Turkey's unique needs and priorities. The nine priority areas are:

- **Consider system impacts when determining location and capacity size:** When selecting zones and capacity sizes, regional characteristics are suggested to be considered. YEKA auctions are suggested to evaluate factors beyond resource availability such as available transmission capacity, local demand, and local value creation. Different regions can offer unique and varying benefits, such as demand distribution or value creation potential.

³ Spain, Portugal, France, UK, Ireland, Italy, Belgium, Netherlands, Greece, Germany, Denmark, Lithuania, Poland, Romania, Cyprus, Croatia, Morocco, Ghana, Zambia, South Africa, Uganda, UAE, Panama, Mexico, Uruguay, Brazil, Peru, Chile, China.

⁴ AURES Methodology is used in assessing YEKA auctions (Assessment Criteria for RES-E Auctions, 2015).

⁵ Local content is calculated as: $[\text{Final Total Product Cost (TL)} - \text{Final Imported Input Cost (TL)}] / \text{Final Total Product Cost (TL)} \times 100$ (Ministry of Science, Industry, and Technology, 2014)

- **Create investor confidence through regularity/periodicity:** Setting an official calendar or periodicity for YEKA auctions and/or YEKDEM with fixed and frequently recurring dates, volumes, and locations, would provide transparency and market certainty for investors is suggested. Setting up a calendar can be complemented by energy demand projections, inter-institutional cooperation and process management, and prolonged PPAs.
- **Diversify capacity size:** Carrying out multi-item auctions, instead of a large single-item auction where the winning consortium is rewarded with all auctioned capacity, is suggested as it might be the key to providing the means for sustainable market development and to supporting the diversity of actors and thereby reducing the risks associated with project failure.
- **Increase access to sustainable financing:** Attracting funds and increasing financing opportunities through governmental, private sector, and national and international financing institutions is suggested as it might be the key to a sustainable renewable energy market. One way to create sustainable financing for market players is to attract international financing. However, certain conditions need to be met for attracting international capital and investor attention, such as increased liquidity in the domestic currency market, decreased level of financing costs, reevaluated adequacy of the bankability criteria, and reevaluated factors in determining ceiling prices in YEKA auctions.
- **Ensure timely delivery of projects:** The requirements and guarantees provided by bidders, and the penalties for delays or non-implementation are suggested to be reevaluated and enforced to ensure that the winning bidder has the capacity and willingness to realise the project(s).
- **Promote technological dynamism:** Installation of efficient and innovative technologies are suggested to be supported with adequate measures so that local production is in line with the technological dynamics of the renewable energy industry. To support the diffusion of these technologies, local content requirements are suggested to favour the latest technology that will create the most added value.
- **Support the YEKA auction model with other policy mechanisms:** YEKA auction model is suggested to be supported by other policy mechanisms to meet the needs of different actors and project types. Updating YEKDEM after 2020 and indexing to YEKA auction cost trends could be an option. This would provide an additional market for small and medium-size investors and expand the geographic reach of investments, resulting in both a positive system and broader socio-economic impact.
- **Transfer learnings to other dispatchable renewable energy technologies:** The accelerated development of the domestic renewable energy market due to YEKA auctions is suggested to be used as an opportunity to create synergies with other dispatchable technologies such as biomass and geothermal energy. YEKA auctions have been a successful tool in decreasing the costs of renewable energy technologies. This might indicate similar outcomes for other renewable energy technologies, yet it is important to note that biomass and geothermal costs depend on additional factors like feedstock price and availability, as well as geographical constraints.

- **Monitor and evaluate the effects of YEKA auctions on the domestic renewable energy market:** Renewable energy in Turkey is still at a low base in terms of total installed capacity. In addition, the market is evolving fast with technological developments, and changing costs and policies. YEKA auctions could play a central role in this rapidly evolving market. Continuous monitoring and evaluation of the impacts of YEKA auctions on the domestic renewable energy market might be crucial to ensure their cost-effectiveness in the following years. Moreover, an information and transparency portal is suggested to be established to enhance the information flow between policy makers and market players. This portal could be designed as a single gateway to access all relevant information on the past, present, and future auctions. This would increase market player confidence and reduce transaction costs for bidders.

YEKA auctions are expected to continue playing a key role in renewable energy capacity investments. It is important to point out that the second new onshore wind YEKA auction that will be carried out in 2019, and the second solar PV auction that was planned to be carried out in January 2019 and is recently canceled take into consideration some of the priority areas identified in this report.

It will be beneficial for Turkey to decide how the role of YEKA auctions within the regulatory framework will look like after 2020, once YEKDEM is finalised. Different options exist besides more cost-effective YEKA auctions, such as a post-2020 YEKDEM, where it is indexed to YEKA auction cost trends and/ or a more dynamic version of the current YEKDEM design and pre-licence auctions. It is essential to start planning for this today to realise the government's plan for an additional wind and solar energy capacity of 20 GW in the next decade, as well as Turkey's full potential of renewable energy that can supply half of all electricity output by 2026.



1. Introduction

A record 167 GW of renewable generation capacity was installed globally in 2017, up from the 161 GW in 2016 and far outstripping the 70 GW of net fossil fuel generating capacity added last year (excluding large hydropower) (Frankfurt School-UNEP Centre/BNEF, 2018). Solar energy installations alone accounted for 98 GW, or more than 55% of the net new renewable energy capacity additions coming online during 2017 (ibid.). Much of this can be attributed to the interaction of policy, cost reductions, and technological innovations.

The conditions affecting renewable energy policy-making have dramatically shifted within a very short time span. The decline in renewable energy costs have significantly accelerated capacity installations. The challenge is about managing power systems with higher renewable energy shares, rather than enabling capacity additions. Therefore, policies try to address the development of pathways for integrating higher shares of variable renewable energy sources of wind and solar into the power system and for adapting an energy system that is becoming more distributed and democratic with increasing participation of consumers in the market. Many countries are joining this paradigm shift to realise the benefits from a more secure, reliable, affordable, and sustainable energy system. The regulatory framework plays a crucial role in managing this shift through establishing long-term investment certainty.

Until recently, the main policy mechanism of choice for renewable energy investments was feed-in tariffs in most countries. Feed-in tariffs have been effective in early stages of renewable energy technologies when costs were still high. Now, countries are moving towards market-based policy mechanisms such as auctions.⁶ Auctions accounted for more than one-third of the total global utility-scale renewable energy capacity additions in 2017 (IEA, 2018). Governments and regulators are increasingly making use of this policy mechanism to minimise project costs (IEA, 2018). By 2022, auctions are expected to be the main policy mechanism for about half of new renewable capacity additions worldwide (IEA, 2017).

Turkey's power sector has benefitted from the implementation of auctions in 2017, which placed the country in the global league of renewable energy countries. Two 1 GW size capacity auctions, one for solar PV and another for onshore wind, took place where PPAs were awarded at US\$6.99 ct/kWh and US\$3.48 ct/kWh, respectively. In addition to accelerating renewable energy investments, the underlying motivation behind Turkey's auctions was creating a local industry through minimum local content requirements and technology transfer (Saygin et al., 2018).

Turkey's electricity demand is growing by 4.8% per year on average, and this trend is expected to continue until 2023 (TEİAŞ, 2017; ETKB, 2018). Over the past 15 years, Turkey's electricity generation capacity has received a total investment of around US\$67 billion, comprising 63% of the total energy sector investment over the same period (including investments in natural gas). 60% of this total went into electricity generation capacity with a purchase guarantee (TÜSİAD, 2018). The remaining 40% was without guarantee and mainly consisted of gas and imported lignite/coal. Total electricity demand is projected to reach 440-550 TWh per year by 2030 (double the current levels) (ibid.).

⁶ Renewable energy auction is a market-based policy mechanism where renewable energy generation capacity is competitively auctioned. Auctions are generally considered to be cost-efficient and are able to bring out the real price of technologies.

This growth potential offers a significant opportunity to invest in local renewable energy resources whilst fulfilling Turkey's top policy priority to reduce the current account deficit due to energy imports that comprise 75% of the total. To realise these capacity investments, it will be important to understand the required regulatory framework and policy mechanisms and how the existing ones can be enhanced. This is particularly important since YEKDEM will expire after 2020 and as the government considers the design and implementation of subsequent YEKA auction rounds in 2018 and onwards.

In view of these crucial questions that concern whether Turkey can achieve a full transformation of its power sector to a more secure, affordable, and sustainable one, this report, in close collaboration with Turkey's energy sector stakeholders, investigates how and in which areas Turkey's YEKA auction policy mechanism can further be improved. The suggestions provided in this report were developed to assist the government's rapidly evolving policy-making process for realising the most cost-effective auction design and regulatory framework that will create a long-term sustainable renewable energy industry capable of meeting the demands of Turkey's growing energy market.

The methodology employed in this report involves three steps. First, an initial phase of comprehensive literature review to identify policy mechanisms for wind and solar PV installations in Turkey and a methodology to assess the performance of YEKA auctions were carried out. Second, best practices for key design elements of YEKA auctions were identified, and auction experiences of 29 other countries were compared across key design elements. Third, interviews were conducted with project developers, consultancies, and sector associations to assess YEKA auctions and identify possible areas for improvement. This third step also involved the discussion of a preliminary draft of this report during the stakeholder consultation held in Istanbul on October 3rd, 2018, where suggestions for improvement of YEKA auctions were further developed.

This report is organised as follows: Section 2 presents the status quo of policy mechanisms for renewable energy in Turkey. Section 3 introduces the methodology applied in this paper. Section 4 provides a performance assessment of the main policy mechanisms implemented in Turkey. In this assessment, it should be noted that YEKA auctions are assessed to the extent allowed by the data available; as only a year has passed since the first round of YEKA auctions was awarded, and the second round for YEKA auctions has only recently been announced and "not yet awarded", "postponed" or "canceled". Section 5 compares the design of YEKA auctions with experiences from other countries and draws recommendations for design improvements for future YEKA auctions. The report concludes with Section 6 that provides broader recommendations to further accelerate renewable energy investment in Turkey.

2. The status quo of policy mechanisms supporting renewable energy capacity deployment in Turkey

To promote sustainable installation of renewable energy for energy production, Turkey has implemented a set of policy mechanisms to enable the appropriate environment for private investments in the renewable energy sector. This section summarises the main policy mechanisms in execution.

Renewable energy targets

Turkey envisions to supply at least 30% of its total electricity from renewable sources by 2023. To this end, a total of 34 GW of hydropower—20 GW wind, 5 GW solar PV, 1 GW geothermal, and 1 GW biomass capacity—is to be installed. By the end of November 2018, Turkey's total installed wind and solar PV capacity comprised 12 GW of the total installed capacity of more than 88 GW. This 12 GW was comprised of more than 5 GW solar PV and 7 GW wind capacity. Generation from these sources represented more than 9% of Turkey's total electricity output by October 2018. With regards to other renewables, Turkey is close to reaching its hydropower target, and surpassed its geothermal target, ranking fourth worldwide. A gap of around 300 MW exists for biomass that predominantly utilises biogas sources.

YEKA auctions

ETKB is responsible for the overall management of YEKA auctions, from the design stage to the awarding of the winning bid. Once the project is awarded, the winning consortium is responsible for implementation. ETKB issued a regulation on Renewable Energy Resource Areas on October 2016, as published in the Official Gazette. The regulation introduced a new policy mechanism to promote renewable energy investments and local manufacturing.

In March 2017, the first solar PV YEKA auction was awarded. The second solar PV YEKA auction was announced in October 2018, and the bidding period was planned to continue until the end of January 2019, but the auction is recently canceled. The first onshore wind YEKA auction was awarded in August 2018. The second onshore wind YEKA auction was announced in November 2018, and the bidding period will end at the beginning of March 2019. In addition, although the first offshore wind YEKA auction was announced in August 2018 with the aim to award the connection capacity in October 2018, it has recently been postponed to 2019.

The first onshore wind and the first solar PV YEKA auctions were single-item auctions where the winning consortium was awarded the right to develop all auctioned capacity. The underlying reasons for these single-item auctions were to create economies of scale and to develop a local renewable industry through local content requirements. The recently announced second onshore wind YEKA auction and recently announced but canceled solar PV YEKA auction are multiple-item auctions. The recently canceled second solar PV YEKA auction was announced with three different contracts, one for each pre-determined zone (Official Gazette, 2018a). Similarly, the second onshore wind YEKA auction was announced in November 2018 through four separate contracts, each with 250 MW capacity (Official Gazette, 2018b). Also, the offshore wind YEKA auction was announced as a single-item auction but postponed to 2019, so its design elements are prone to change. Moreover, an announcement was made for the development of new solar PV YEKA auctions, each ranging between 40-50 MW in capacity, distributed to the entire land of Turkey (Yeşil Ekonomi, 2018).

The winners of YEKA auctions are awarded with connection capacity utilisation rights and a 15-year power purchase agreement (except for offshore wind YEKA auction, where the auction winner will be awarded with a purchasing guarantee for the first 50 TWh of electricity produced). The duration of the PPA starts immediately after the contract is signed, to incentivise early commissioning. Moreover, the administrative processes are shortened by facilitating the allocation of publicly-owned and treasury properties, the licensing processes, and connection capacity; and not requiring YEKA bidders to submit a resource assessment report (KALİ Energy Solutions, 2017).

So far, awarded and announced YEKA auctions have been limited to a single-technology. YEKA auctions are not site-specific, nevertheless, locations are limited to pre-determined zones. A limitation for project size in each zone was set only in the first onshore wind auction, where the awarded capacity is to be met with projects of at least 50 MW capacity in each pre-determined zone.

YEKA auctions are hybrid auctions. After a sealed-bid auction, the five lowest bids are invited to a descending clock auction. There is a disclosed ceiling price for the sealed-bid phase. To reduce the risk of underbidding, all bidders must meet the minimum financial and technical reputation requirements specified in the auction notice. In addition, bidders are requested to submit bid and completion bonds.

The underlying motivation of YEKA auctions is driven by an industrial strategy with minimum local content requirements, mandatory local workforce requirements, and in some cases, the need to establish manufacturing capacities and research and development facilities. The lowest price criterion is used in awarding the PPA. The price set in the PPA is established by a pay-as-bid policy mechanism. In YEKA auctions, standard penalty measures are considered, i.e., the execution of financial guarantees and the cancellation of contracts.

Table 1 summarises the design elements of the five YEKA auctions awarded or announced as of December 2018.

Table 1: Status of YEKA auction design elements, as of December 2018

Design elements	Solar PV 1	Solar PV 2	Wind onshore 1	Wind onshore 2	Wind offshore
	Announced: October 2016 Awarded: March 2017	Announced: October 2018 Canceled: 13 January 2019	Announced: April 2017 Awarded: August 2017	Announced: November 2018	Announced: June 2018 / postponed to 2019
Regularity/periodicity	No calendar established.				
Authority	MENR				
Object of auction					
Capacity	1 GW				1.2 GW
Item	Single	Multiple: 500 MW at Şanlıurfa-Viranşehir; 200 MW at Hatay-Erzin; 300 MW at Niğde-Bor.	Single	Multiple 4x250 MW The total installed capacity in each site cannot be lower than 70% (175 MW) of the auctioned item (259 MW).	Single

Power purchase agreement (PPA)	15 years in US\$	15 years in US\$	15 years in US\$	15 years in US\$	Power Purchase Guarantees for the first 50 TWh of the electricity produced
Technology	Solar PV	Solar PV	Wind onshore	Wind onshore	Wind offshore
Site	Konya Karapınar	3 regions: Şanlıurfa-Viraneşehir, Hatay-Erzin, Niğde-Bor	5 regions: Kayseri-Niğde, Sivas, Edirne-Kırklareli- Tekirdağ, Ankara- Çankırı-Kırıkkale, Bilecik-Kütahya- Eskişehir	4 regions: Balıkesir, Çanakkale, Muğla, Aydın	3 regions: Saros, Gelibolu, Kiyıköy
Project size			At least 50 MW ⁷ at each pre-defined zone		
Type of auction	Hybrid: Sealed-bid, followed by reverse auction. The lowest five bidders are invited to the reverse auction.				
Ceiling prices	US\$8 ct/kWh	US\$6.50 ct/kWh	US\$7 ct/kWh	US\$5.5 ct/kWh	US\$8 ct/kWh
Requirements	Minimum of financial & technical reputation				Minimum of financial & technical reputation. Minimum requirement for system components.
Guarantees	Bid bond (US\$10 million) Completion bond (US\$50 million)	Bid Bond: Şanlıurfa-Viraneşehir (US\$3 million); Hatay-Erzin (US\$1.5 million); Niğde-Bor (US\$2 million). Completion Bond: Şanlıurfa-Viraneşehir (US\$15 million); Hatay-Erzin (US\$8 million); Niğde-Bor (US\$12 million).	Bid bond (US\$10 million) Completion bond (US\$50 million)	Bid bond (US\$2.5 million) Completion bond (US\$12.5 million)	Bid bond (US\$2.5 million) Completion bond (US\$12.5 million)

⁷ The individual projects of up to 1 GW capacity awarded should have at least 50 MW capacity each.

Design elements	Solar PV 1	Solar PV 2	Wind onshore 1	Wind onshore 2	Wind offshore
Local content requirements	<p>Not less than 65% local content.</p> <p>The winning bidder will also have to install a solar panel manufacturing plant of at least 500 MW capacity in Turkey, in less than two years (21 months after the contract date).</p> <p>100 permanent technical personnel will be employed at the Research and Development (R&D) center.</p>	<p>Solar panel, not less than 60%. Other system components (cable), not less than 51%.</p> <p>No requirements on local employment.</p>	<p>Not less than 65% local content.</p> <p>80% of engineers to be employed on the project are required to be Turkish nationals.</p> <p>Developing a local R&D center is mandatory.</p>	<p>Minimum 55% for wind turbines.</p> <p>Turbine tower: 65%, Blade: 60%, Other parts: 51%.</p> <p>Wind turbines are to be produced with up-to-date technology, IEC 61400 standards series and with 3.0 MW of minimum power.</p>	<p>Not less than 60% local content.</p> <p>80% of project employees are required to be Turkish nationals.</p>
Selection criteria for winning bids	Lowest price				
Establishing the final price	Paid-as-bid				
Penalties	<p>Execution of the guarantees.</p> <p>Cancellation of the contract (PPA).</p>				
Policy mechanisms	Facilitation of administrative processes, land use rights and connection infrastructures.				
Information and transparency	No official repository containing all official auction information or additional information to facilitate the development of bids.				

Other policy mechanisms

YEKDEM

In 2005, the Law No. 5346 on “Utilization of Renewable Energy Sources for the Purposes of Generating Electrical Energy” was adopted in Turkey. Law No. 5346 introduced a feed-in tariff, YEKDEM, as a policy mechanism to support electricity generation from domestic renewable energy resources.

According to Law No. 5346, the electricity generation beneficiary projects should be in operation before December 31, 2020 to be eligible for YEKDEM benefits and to be awarded the right to sell power at prices determined by the established feed-in tariffs during the first 10 years of operation. These established tariff levels for different renewable energy technologies can be analysed in Table 2.

Table 2: YEKDEM tariffs for renewable energy technologies (excluding feed-in premiums for local content)

YEKDEM tariffs (US\$ ct/kWh)	
Hydropower	7.3
Wind energy	7.3
Geothermal energy	10.5
Biomass energy	13.3
Solar energy	13.3

Feed-in-tariffs generally work as follows. All investors receive the tariff set by the government. Grid connection is guaranteed to all renewable energy projects. Allocation strategies for connection are executed on a first-come first-served or pro-rata basis, and there are no investment restrictions regarding capacity amounts. However, YEKDEM’s policy mechanism is particularly different due to technical limitations of the transmission system. According to YEKDEM, both licensed and unlicensed energy generation facilities can benefit from the policy mechanism, yet they are subject to different procedures.

Licensed renewable energy generation model deals with facilities with over 1 MW of installed capacity. Project developers of these facilities should apply to Energy Market Regulatory Authority (Enerji Piyasası Düzenleme Kurulu, EPDK) for pre-licensing, to obtain the connection capacity utilisation rights, which are announced beforehand by the Turkish Electricity Transmission Corporation (Türkiye Elektrik İletim A.Ş., TEİAŞ). Production licence can be obtained only if the requirements, such as necessary permits and warrants, are met during the pre-licence period (24 months). If there is only one project developer applying for one connection capacity, the developer is awarded the pre-licence and the right to sell power at prices determined by the established YEKDEM tariffs during the first 10 years of operation. However, if more than one solar or wind project developers apply to EPDK for the same connection capacity, they are subject to pre-licence auctions, which is a unique and innovative queue management strategy developed in 2011 to manage connection capacity (IRENA, 2015). The regulatory framework for pre-licence auctions are defined in “Pre-Licence Tender Regulation for Wind and Solar Energy Projects”, issued by EPDK at the

end of 2013. These pre-auctions can be classified as reverse auctions, and they call for reduction from the YEKDEM tariffs. Auction winners will be awarded the right to sell power at prices determined by the winning bid instead of the fixed YEKDEM tariff, during the first 10 years of operation. Pre-licence auction model is only applicable to wind and solar PV capacity installations, and it does not affect local content incentive.

Unlicensed renewable energy generation model deals with projects with up to 1 MW capacity that do not require a production licence. For these projects, project developers do not need to bid for connection capacity, and the administrative processes are simplified (e.g., project developers are not required to establish a company and can apply throughout the entire year) (Invest in Turkey, 2018a).

Local content incentive (feed-in premium)

Law No. 5346 provides support for local content for the share of capacity that is installed using domestically manufactured equipment. Local content support is an extra policy mechanism supporting the renewable energy market. It is an additional premium added to YEKDEM prices, provided during the first five years of operation and only to licensed facilities (Invest in Turkey, 2018a).

Support for land acquisition

If the Ministry of Environment and Urbanisation (Çevre ve Şehircilik Bakanlığı, ÇŞB) or the Ministry of Treasury and Finance (Hazine ve Maliye Bakanlığı, HMB) grants permission, designated forested areas, land that is privately owned by the Treasury, or disposable state land can be utilized for renewable energy production. Renewable energy production capacities are exempt from Forestry Peasant Development Revenue and Forestation, and Erosion Control Revenue charges (ibid.). Moreover, 85% of land payments and fees are discounted during the first ten years of investment and operation of power transmission lines. This discount is also applicable to the power transmission lines in operation (ibid.).

License fee reductions

For renewable energy production capacities, the licence holder is exempt from annual licence fees for the first eight years following the completion of project development. Furthermore, a 90% discount is applied to pre-licence and licence application fees (ibid.).

Investment mechanisms

Renewable energy production capacities benefit from the General Investment Incentive Scheme, waiving Value Added Tax (VAT) and Customs Duties for all relevant machinery and equipment used in the facility, regardless of the region where it is developed (ibid.).

3. Methodology

This study was conducted in three phases. First, a comprehensive literature review was conducted to identify policy mechanisms for, and assess the performances of, wind and solar PV capacity developments in Turkey.

Second, key design elements for renewable energy auction policy mechanisms in the world and in Turkey were identified by analysing auction experiences of 29 other countries and comparing their auction design elements.

Third, open-ended interviews were conducted with stakeholders on YEKA auction design elements, and possible recommendations for improvement. This third step also involved a stakeholder consultation held in Istanbul on October 3rd, 2018, where a preliminary draft of this report was discussed and suggestions for improvement of YEKA auctions were further developed.

The methodology is based on both the best practices as identified in academic literature, and more concretely, the findings of the AURES Project on Promoting Effective Renewable Energy Auctions (AURES), and is used to assess the performances of YEKA auctions and YEKDEM policy mechanisms (Del Río, et al., 2015).

Table 3 provides an overview of these assessment criteria provided by AURES.

Table 3: The criteria used in performance assessment of YEKA auctions and YEKDEM

Criteria	Description	Indicator
Effectiveness	Effectiveness is defined as the degree to which renewable energy auction design elements result in renewable energy production capacity within a specified time period (IPCC, 2011). The simplest indicators to measure effectiveness are installed capacity, electricity output and/or its growth rate, and project realization rate, either in absolute or percentage terms.	GW; % renewable energy; GW/GW _{target}
Efficiency	Efficiency is defined as the ratio of outputs to inputs. <i>Efficiency is mostly measured at one point of time (static efficiency) and is also called cost-effectiveness (US\$ ct/kWh), i.e., reaching the energy production capacity target (kWh) at the lowest possible generation cost (US\$ ct).</i> (IPCC, 2011).	US\$ ct/kWh
Socio-economic and environmental impact	Auctions are increasingly used to achieve secondary objectives related to socio-economic and environmental impacts. These impacts can be at municipal, regional, national and/or international/global levels. The identification of local content requirements to create local employment and industrialization is a clear example of these objectives. Typical indicators for socio-economic and environmental impact are jobs/GW, and CO ₂ avoided/GW, respectively.	Jobs/GW; Emissions of carbon dioxide (CO ₂) avoided/GW; Avoided fossil fuel imports/GW
Feasibility	Feasibility is about the difficulty of adopting a policy mechanism in a domestic/national setting. It considers the institutional and human capacities, social acceptability, and political feasibility needed for the optimal functioning of the respective policy mechanism in a domestic setting. This criterion is also referred as replicability.	Qualitative

Table 4: Definitions of YEKA auctions' key design elements

Design elements	Definition
Regularity/periodicity	A pre-set periodicity or regularity in holding the auctions establishes the base of trust for investors and increases market competition.
Authority responsible for the auction	It is critical that the responsibilities and obligations of all institutions involved in the process are defined by law. The responsible authority must be regarded as an independent institution and should have the necessary human, technical, and financial resources.
Power purchase agreement (PPA) & object of auction	Object of auction defines what is auctioned, how much of it is auctioned, and the auction conditions. Usually, the auction winner(s) is (are) awarded with a PPA at the price determined at the auction. PPA details should be announced prior to the auction.
Technology	In technology-specific auctions, only the projects that employ the technology specified in the auction announcement can apply. In technology-neutral auctions, projects with all technologies can participate (including non-renewables). As a combination of these two approaches, auctions for two or more renewable technologies can be designed.
Site	In site-specific auctions, project location is predetermined. In site-neutral auctions, project developers can choose the location without any limitations. As a combination of these two approaches, project developers can choose the exact location for their project(s) among predefined zones.
Project size	Auction participation can be limited to projects under a certain capacity. Conversely, project sizes can have a minimum for installation capacity.
Auction Type	<p>Auction types can be classified into sealed-bid, dynamic-bid, and hybrid-bid.</p> <p>Sealed-bid. Bidders present their offers using sealed envelopes, on a single occasion. All sealed-bids are opened simultaneously, and all bidders are informed of the price at the same time.</p> <p>Dynamic auction. Bidders know the offers of their competitors. They can subsequently modify their own bids for as long as the auction is open. The two sub-types of dynamic auction are:</p> <ul style="list-style-type: none"> • Ascending auctions: Valid opening bids must be as high as or higher than the determined reserve price. After the first round of bids are revealed, bidders submit the second round of bids with ascending prices, outperforming the respective best offer. Bids escalate until the contract is awarded to the bidder offering the highest and final price; • Descending clock auctions: Auctions start with a certain ceiling price set by the auctioneer. In the first round, bidders offer prices lower than the ceiling price, which cannot be changed in the successive rounds. The auctioneer lowers the price in each round, while bidders withdraw their bids. Those who keep bidding until the end of the auction win. <p>Hybrid auction. An auction can be designed in two phases, combining sealed-bid and dynamic auctions. The two most used variations of hybrid auctions are:</p> <ul style="list-style-type: none"> • Sealed-bid + dynamic (Round Robin) auction • Descending clock + sealed-bid auction
Ceiling prices	Ceiling price is a pre-set price. Bids higher than the ceiling price are not valid. The ceiling price can be disclosed or unknown to the bidders.
Requirements	<p>Requirements are set to attract serious project developers or projects:</p> <ul style="list-style-type: none"> • Requirements for project developers are usually financial (minimum income volume, balance sheet) and technical (proven expertise in similar projects). • Requirements for projects are generally adapted for each technology, and handle connection permits, resource assessments, and environmental impact assessments.
Guarantees	<p>Commonly used financial guarantees are:</p> <ul style="list-style-type: none"> • Bid bonds to guarantee that the contract is signed, and • Completion bonds to secure on-time construction of the project.

Design elements	Definition
Local content requirements	A percentage of the project must be domestically manufactured or procured. In some cases, local requirements might involve employment.
Selection criteria for winning bids	<p>There are two main selection criteria for winning bids: price-only auctions and multi-criteria auctions.</p> <ul style="list-style-type: none"> • At pure price auctions, price is the only award criterion. • Multi-criteria auctions generally consider both price and non-price factors. In addition to the lowest price possible, a multi-criteria auction design allows the auction to achieve multiple policy objectives (such as local employment, local environment and industrial development.) In a multi-criteria auction design, clear criteria measures should be set at the start, to secure objective decisions.
Establishing the final price	<p>Two different approaches to establishing the final price are:</p> <ul style="list-style-type: none"> • In the pay-as-bid approach, the winning bid price level sets the final price, and each winner receives its own bid. • In the uniform pricing approach, all winners receive the winning price set by the last bid needed to meet the auctioned volume or the first bid that overpasses the auctioned volume.
Penalties	Penalties for non-compliance or delays are sanctions that are often due to delays in commencing operations or electricity generation shortfalls.
Policy mechanisms	Policy mechanisms are additional mechanisms supporting winning bids, such as access to financing, land, and grid.
Information and transparency	Information and transparency refer to the accessibility of information on previous auctions or project development processes.
Financing opportunities	Financing opportunities refer to financial strategies for creating a sustainable domestic renewable energy market.
Processes	Processes refer to the management of auction elements throughout an auction's life-cycle.

After the literature review, eleven semi-structured interviews were conducted between July and September 2018, with different market actors: three industry associations, two consulting firms, and six project developers. All of these stakeholders are active in the wind energy sector, and five of them also operate in the solar PV sector. See Annex A for the guiding interview questions.

Finally, a stakeholder workshop was organised in Istanbul on October 3rd, 2018 for validating the results and refining the recommendations for further improvement. See Annex B for stakeholder meeting minutes.



4. Performance Assessments: YEKA Auctions and YEKDEM

As there are trade-offs between costs and benefits of any policy mechanism, these mechanisms should regularly be assessed for their performance. Therefore, regular performance assessment is essential in identifying improvement areas for minimising costs and maximising benefits of any policy. This section addresses the performance of the main policy mechanisms designed to support the development of renewable energy capacity in Turkey, i.e. YEKA auctions and YEKDEM. Since YEKA auction policy mechanism has only been recently implemented, its long-term outcomes cannot be fully assessed yet; therefore, its evaluation within the scope of this study is limited.

Assessment of the performance of YEKA auction model and YEKDEM should be carried out against the objectives of these policies and their predefined success criteria and indicators. Effectiveness, efficiency and socio-economics impacts are assessed within the scope of this study (see Section 3: Methodology, for a detailed overview of the methodology for YEKA design assessment and relevant definitions).

Performance assessment of YEKA auctions

Effectiveness

The primary objectives of YEKA auctions are to develop local manufacturing capacity, transfer technology, and create a competitive domestic market for low-cost renewable energy through a model that is inclusive of both public and private sectors. Two YEKA auctions were held in 2017: 1 GW onshore wind and 1 GW onshore solar PV. Both required the establishment of a domestic equipment production facility and had local content requirements. The minimum required capacity for the domestic equipment production facility for wind is production of 150 wind turbines per year, and a minimum capacity of 2.3 MW for the first 350-400 wind turbines. The turbines are required to have a minimum of 65% local content, including tower and blades. For solar PV, the minimum required capacity for the domestic equipment production facility is 500 MW/year. The solar panels are required to have a minimum of 60% local content for the first 500 MW, and 70% local content for the second 500 MW, i.e. average 65% local content requirements in total.

An offshore wind YEKA auction with a total capacity of 1.2 GW was planned to take place in October 2018, and is recently postponed earliest to 2019. A YEKA auction for solar PV with a total of 1 GW installed capacity was announced to take place in January 2019, but is recently canceled. This auction was announced as a multi-item auction in three separate zones, with capacities of 200 MW, 300 MW, and 500 MW. Additionally, another onshore wind YEKA auction with 1 GW total capacity is announced to take place in March 2019 as a multi-item auction in four separate zones, each with 250 MW capacity. In 2018, ETKB stated their plans for upcoming YEKA auctions with different sizes and time schedules (Enerji IQ, 2018).

To summarise, there are three YEKA auctions for wind: one 1 GW onshore wind capacity carried out in 2017; a 4x250 MW onshore wind auction that has recently been announced; and one 1.2 GW offshore wind auction planned to be re-announced in 2019. Assuming no delays in the commissioning of winning bids, these three YEKA auctions will realise the installation of a total of 3.2 GW wind capacity over a period of five years, starting in 2019 and commencing operations in 2023-2024.

To compare the effectiveness of these targeted wind capacity installations of YEKA and YEKDEM policy mechanisms, comparing their wind capacity installations over a similar timeframe is helpful.

By the end of November 2018, Turkey's total installed onshore wind capacity reached almost 7 GW (TEİAŞ, 2018). 5.7 GW of this capacity was installed between 2013 and 2018. The remaining 1.3 GW was installed between 2005 (when YEKDEM was first announced) and 2013. One can observe that unless new YEKA auctions are introduced, wind capacity installations realised through YEKA auctions (3.2 GW) will be lower than what was achieved with YEKDEM between 2013 and 2018. It should be noted any delays in 3.2 GW wind capacity installations of YEKA auctions would decrease the effectiveness of this policy mechanism. Also, the achievement of 5.7 GW onshore wind capacity installations through YEKDEM between 2013 and 2018 might be a partly artificial outcome, since investors raced to benefit from YEKDEM before it expires in 2020 (Verk, 2016).

The first solar PV YEKA auction of 2017 aims to deliver 1 GW total-capacity utility-scale projects in 54 months, starting from the signing of the Usage Right Agreement (i.e. between 2017 and 2022). Another YEKA auction for solar PV with a total of 1 GW installed capacity was planned to take place in January 2019, to commence operations in five years. However, this YEKA auction is recently canceled. Thus, a total of 1 GW of solar PV capacity is planned to be installed until 2022 through one solar PV YEKA auction. Compared with these numbers, under YEKDEM, more than 5 GW solar PV capacity was installed by the end of November 2018. Thus, it could be stated that YEKDEM has been effective in reaching 2023 targets of 5 GW solar PV installations. However, it is difficult to compare the effectiveness of YEKDEM and YEKA auction policy mechanisms for solar PV, since almost all installed solar PV capacity developed through YEKDEM is unlicensed small-scale projects, with capacities of 1 MW or less. The processes unlicensed projects are subject to are much more similar to a feed-in tariff system that is typically implemented in other countries: project developers do not need to participate in a capacity bidding process and the administrative processes are simplified compared to the licensed projects with a bidding process for grid access. Moreover, not only are these unlicensed small-scale solar PV projects are carried out with the self-initiative of the investors, but they also are aimed for self-consumption, not auctioned, and not subject to any policy mechanisms other than YEKDEM. Whereas, YEKA auctions are part of a broader policy of technology transfer and technical capacity building, and they are supported with other policy mechanisms such as land use rights and connection infrastructures. It is also important to note that the effectiveness of YEKA auctions in terms of new capacity deployment in a given time is of secondary importance, since the primary objective is to create an industry.

Efficiency

Regarding static efficiency, awarded onshore wind projects under the YEKA auction scheme was highly competitive. In the 30th round of the descending clock auction, the winning Siemens Gamesa – Türkerler – Kalyon consortium submitted the lowest bid at US\$3.48 ct/kWh. The remuneration of the YEKA auction contract is 42% below the 2017 global average onshore wind auction price of US\$6 ct/kWh (IRENA, 2018c). Moreover, it is 52.3% less than the current YEKDEM tariff (at US\$7.3 ct/kWh, excluding feed-in premiums) and half of the ceiling price of US\$7 ct/kWh (IRENA, 2018a). While the competitive US\$3.48 ct/kWh final price is rightly celebrated, it should be noted that

this price includes costs and risks that related with the local content requirements, which also holds true for solar PV auction prices.

The 2017 onshore wind YEKA auction attracted eight consortiums, all of which included international companies, including the top seven global wind turbine manufacturing companies based on revenue, both by total installed capacity and capacity installed only in year 2016, and covering more than 70% of the global wind energy market (*Wind Power Monthly*, 2017).

The 2017 solar PV YEKA auction attracted a total of four consortiums. In the 19th round of the descending clock auction, the winning Kalyon-Hanwha Group consortium submitted the lowest bid at US\$6.99 ct/kWh. The remuneration of the YEKA auction contract is just below the global average for solar PV auction prices in 2017 (IRENA, 2018c). Moreover, it is 47.4% less than the current YEKDEM tariff (at US\$13.3 ct/kWh, excluding feed-in premiums) and only 13% less than the ceiling price of US\$8 ct/kWh. The low number of bidders in this auction can be attributed to the low level of utility-scale local solar PV project developers, high local content requirements, and the challenging bidding calendar.

Socio-economic impacts

Requirements regarding development of domestic manufacturing capacities, and local content requirements are instruments that are primarily conducive to creating economic impact through the creation of a local industry. In the first onshore wind and solar PV YEKA auctions, mandatory development of manufacturing capacities and research and development facilities, and high local content requirements of 65% for the capacity installations were set. In the second onshore YEKA auction, recently canceled solar PV YEKA auction, and recently postponed offshore wind YEKA auction, no mandatory development of manufacturing capacities and research and development facilities are required, yet high local content requirements for the capacity installations are continued to be set (55% for onshore wind, and 60% for recently canceled solar PV and the recently postponed offshore wind.)

Considering the lack of renewable energy manufacturing facilities and the low local content in domestic production of renewable energy technologies in Turkey, the effectiveness of YEKA auctions in promoting local value will be high.

Siemens Gamesa of the winning Siemens Gamesa – Türkerler – Kalyon consortium of the first onshore wind YEKA auction, undertakes the establishment of an assembly-based turbine manufacturing factory in Turkey within 21 months of signing the contract. This factory should have the capacity of manufacturing at least 150 turbines per year, and the first 350-400 wind turbines should have a minimum capacity of 2.3 MW. The production in this manufacturing facility will have to meet the mandatory 65% local content requirements, including power and blades.

The new onshore wind YEKA auction requires a minimum of 55% local content requirements for wind turbines, with 65% for turbine tower, 60% for blade and 51% for other components, but does not require the establishment of a local equipment manufacturing facility.

The winning consortium of the first YEKA auction for solar PV (Kalyon-Hanwha Group consortium) is required to commission a manufacturing facility with a minimum of

500 MW module capacity per year. Like, wind turbine manufacturing capacity, the production in this manufacturing facility will have to meet the mandatory average 65% local content requirements. As experts estimate that average local content of solar PV projects currently range between 40% and 50%, the meeting of 65% local content requirements through this facility is expected to close the localisation gap, mainly through the domestic production of solar cells and panels.

The recently canceled new solar PV YEKA auction requires a minimum of 60% local content requirement in solar panels and a minimum of 51% in components (cable, cable route, load-bearing construction, and inverter), but does not require the establishment of a local equipment manufacturing facility.

In terms of job creation, it is estimated that during the construction phase, only 30% of the total labour force to construct and operate a 50 MW onshore wind capacity is needed (IRENA, 2017a). To guarantee that these jobs are created locally, the first onshore wind YEKA auction requires 80% of engineers employed in the project to be citizens of Turkey. Considering the average labour force needed to construct, operate, maintain, and decommission the first onshore wind (IRENA, 2017a), the first solar PV (IRENA, 2017b) and the recently postponed offshore wind (IRENA, 2018a) projects together with the local content requirements set in the YEKA auctions, 2.54, 4.07 and 3.61 million days of labour force can be expected to be created, respectively.

Finally, 100 permanent technical staff will be employed at each of the mandatory research and development centres for wind and solar, which will be developed by the winning consortiums of the first round of YEKA auctions.

Performance assessment of YEKDEM

Wind capacity development under YEKDEM

Total installed wind capacity in Turkey surpassed 7 GW by the end of July 2018. By comparison, almost 0.9 GW capacity is under construction, and around 2.5 GW is licensed and in the process of obtaining construction permits. Thus, there is around 3.4 GW licensed capacity that is not in operation yet. All these amount to 10.4 GW of current licensed capacity by the end of July 2018 (TÜREB, 2018).

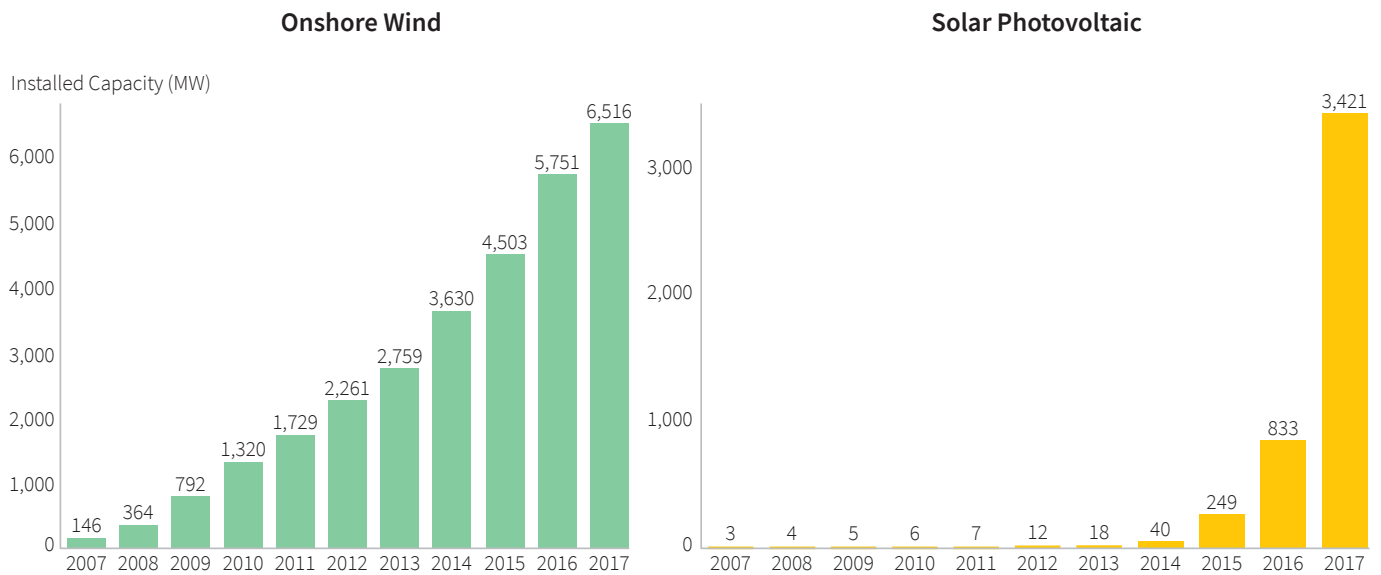
On top of this licensed capacity, pre-licence applications for 3 GW connection capacity were collected in 2015. The pre-licence auctions for this capacity were carried out in June 2017 (710 MW) and December 2017 (2,130 MW) by the transmission system operator, TEİAŞ. It should also be noted that an extra 2 GW connection capacity was announced in 2015, which will be auctioned for pre-licence applications in April 2020. Thus, in 2023, if all these licensed and pre-licensed projects come online (10.4 GW licensed capacity, 3 GW auctioned capacity, and 2 GW capacity to be auctioned), the total installed wind capacity would be around 15.4 GW, which is equivalent to more than 75% of the 2023 target of 20 GW wind capacity (ibid).

Solar capacity development under YEKDEM

Turkey's first round of pre-licence capacity auctions for utility-scale solar PV under YEKDEM was launched for 600 MW in 2013 and finalised in 2015. Most of these projects are still under construction and by November 2018, only 9 projects, with a total of 81.7 MW of licensed capacity commenced operation (TEİAŞ, 2018).

Until the end of 2016, cumulative small-scale unlicensed solar PV capacity (under 1 MW) installed was around 0.83 GW. In 2017, approximately 2.6 GW of new small-scale unlicensed solar PV capacity was installed. By the end of November 2018, the installation of unlicensed small-scale solar PV capacity increased more than 1.5 GW. Thus, adding the licenced capacity in operation to these results, the cumulative 5 GW solar PV capacity target for 2023 is reached by November 2018. One of the main reasons behind the sudden increase in solar PV installations is to benefit from YEKDEM before it expires by the end of 2020 (Renewables Now, 2017).

Figure 1: Cumulative installed capacity of onshore wind and solar PV in Turkey, January 2007- December 2017



Source: (IRENA, 2018b)

Effectiveness

With regards to effectiveness of wind capacity deployment, YEKDEM succeeded in promoting a steady increase of annual capacity since 2007 (see Figure 1). Nevertheless, the 2023 target cannot be met at the current pace. At the current rate of 600-800 MW capacity installations per year and with the awarded and planned pre-licence capacity auctions, 11 to 15.4 GW of total wind capacity is expected to be reached through YEKDEM by 2023. Comparing this with the 20 GW wind capacity target for 2023, the remaining capacity gap would need to be met with new YEKA auctions or more aggressive wind capacity installations, supported by other policy mechanisms.

At the current rate of installation, the 5 GW solar PV capacity installation target of 2023 is met, with almost 1.6 GW new solar PV capacity installed in the first eleven months of 2018. Nevertheless, it should be noted that these results yield mixed conclusions regarding effectiveness of YEKDEM in promoting utility-scale grid-connected licensed projects, since most (4.92 GW in total) of the installed capacity is unlicensed small-scale solar PV projects with capacities of 1 MW or less.

The main reasons for the delays and limited installation of the utility-scale pre-licensed solar PV projects are land acquisition, permission, and financing issues (Renewables Now, 2017). In addition, due to the sharp decrease in solar PV panel costs, project developers tend to wait for further price decreases and delay the commissioning of projects. These delays are further intensified with uncertainties about the post-2020 legislative framework.

Efficiency

Efficiency of wind installations through YEKDEM has been very high. Since project developers applying to YEKDEM are required to participate in a pre-licence auction to be awarded with connection capacity, YEKDEM program is de facto an auction scheme. Auction prices have displayed a downward trend with the implementation of YEKDEM. The price for wind capacity installations has dropped from the initial YEKDEM tariff of US\$7.3 ct/kWh in 2005 to the lowest bid received in December 2017, below zero, at US\$-2.87 ct/kWh.⁸ It should be noted that, the sharp decrease in prices might be a signal of underbidding and reduced profitability.

A major reason for underbidding is the uncertainty regarding future opportunities for wind capacity access. There has been no calendar or periodicity established for pre-licence auctions. In addition, long periods between the announcement and the implementation of wind capacity auctions contributed to the uncertainty caused by the lack of information on upcoming auction dates. Furthermore, the lack of alternatives to reach capacity access outside the auction scheme has increased the bidders' incentive to bid aggressively to win a contract and secure project sites. The negative prices and underbidding might lead to difficulties in securing financial resources, long delays in closing financial transactions, or even worse, project failure.

Socio-economic impacts

By the end of 2016, approximately 94,400 people were employed by the renewable energy sector in Turkey (excluding large hydropower but including waste-to-energy technologies). 12,700 people worked in solar PV, 16,600 in solar heating and cooling, and 53,000 in wind energy markets (IRENA, 2017c). Total employment numbers in this sector decreased in 2017. In 2017, the total number of people working in the renewable energy sector was approximately 84,000 (excluding large hydropower but including waste-to-energy technologies). The number of people working in solar PV increased to 33,400, while employment in solar heating and cooling remained constant at 16,600. Meanwhile, the number of jobs provided by wind energy decreased to 14,200 (IRENA, 2018d).

⁸ Negative price bidders do not benefit from YEKDEM. They have to pay the negative bid as participation rate on top of the market clearing price per kWh they sell.

5. Assessment of YEKA auction model benchmarked against international best practices

This section compares the design of YEKA auctions against international best practices across key design elements (Factor, 2017). It incorporates the feedback provided by practitioners during the interviews and the stakeholder consultation meeting. Table 5 compares international best practices in renewable energy power auction design with that of YEKA auctions. (Please refer to Annex C for worldwide distribution of auction design elements.)

Table 5: Assessment of YEKA auction model benchmarked against international best practices

International Best Practices	Assessment	Recommendations for Improvement
Regularity/periodicity		
<p>The renewable energy industry notes the importance of publishing a multi-annual calendar with dates of auctions and volumes to be auctioned, but this is an ambitious exercise for some countries. Achieving regularity and announcing auctions in advance allows bidders the time to prepare competitive offers and provides the necessary conditions to promote competition.</p> <p>Auction experiences clearly indicate that a series of auctions over time is preferable to auctioning the total volume at once. Auction series increases competition, and consequently efficiency, and allows for betterment of design in between auctions.</p> <p>Mexico secured carrying out at least one auction per year by Law.</p>	<p>Regularity/periodicity in YEKA auctions is suggested to have positive impact in YEKA auction preparation processes.</p> <p>So far, one YEKA auction for onshore wind, and one YEKA auction for solar PV are carried out in 2017. One YEKA auction for onshore wind is announced to be carried out in 2019, one YEKA auction for solar PV was announced with bids to be accepted until the end of January 2019 but is recently canceled and, and one offshore wind YEKA auction is recently been postponed earliest to 2019. Although plans for regularity/periodicity has been announced, there is currently no established calendar or regularity that also indicates the amount of future auction volumes.</p> <p>Uncertainty on volumes and upcoming YEKA auction rounds reduces project developer interest and actor diversity, as small players can bear less uncertainty.</p> <p>Periodicity is suggested to make investment planning for future YEKA auctions easier, facilitate resource measurement planning and validity, and increase (international, and small and medium-scale) actor diversity in the domestic renewable energy sector.</p> <p>Moreover, the timeframe between the date of YEKA auction announcement and the submission deadline is suggested to be limiting, considering the need to form consortiums and carry out technical and financial assessments.</p>	<ul style="list-style-type: none"> - It is suggested to establish ambitious but realistic midterm and long-term targets. - In accordance with these targets, it is suggested to establish a clear schedule, a calendar or periodicity. - The calendar is suggested to include information on dates, volumes, and locations. - The calendar is suggested to be developed with the aim to provide confidence and certainty in sustainability of the development of the renewable energy sector in Turkey. For this, the calendar is suggested to consider domestic energy demand projections, information about the frequency of YEKA auctions, and the needs underlying the development of these auctions. - Calendar, regularity and/or periodicity is suggested to be strengthened by inter-institutional cooperation and process management. <p><u>Recent developments:</u></p> <p>In October 2018, 10 GW of solar PV and 10 GW of new wind capacity installations were announced. These are planned to be carried out in the next 10 years, most likely with YEKA auctions. This development of regularity/periodicity is suggested to be established on a legal basis.</p>
Authority responsible for the auction		
<p>Relevant independent institutions with necessary human, financial, and technical capacities are needed. If possible, responsibilities and obligations of all institutions involved in the process should be defined by law.</p> <p>Brazil (ANEEL), Uruguay (URSEA), and Peru (OSIN-ERGMIN) have designated the regulator as the authority responsible for the auction. In Mexico, the market operator conducts the auctions.</p>	<p>ETKB, supported by a Commission of one president and a minimum of four permanent members are responsible for the implementation of the auction. There are also other substitute members for in case the permanent members need to be deputized. The total number of members in the Commission should be uneven.</p>	<ul style="list-style-type: none"> - As more YEKA auctions are carried out and other regulatory frameworks are developed, the institutional setting for the auctions might be needed to be strengthened. A separate entity could be considered, depending on how the sector grows.

International Best Practices	Assessment	Recommendations for Improvement
Power purchase agreements (PPA) & object of auction		
<p><u>PPA:</u></p> <p>The winners are awarded with a PPA at the final auction price. The details of the PPA should be announced in advance (preferably, the standard PPA should be included as an annex in the auction documents).</p> <p>Most countries offer long-term PPAs in US\$ and annually indexed. European PPAs are in Euros, Brazil PPAs in their local currency (Reais), and Mexican PPAs in either their local currency (Pesos) or US\$.</p> <p><u>Object of auction:</u></p> <p>There might be different objects of auctions:</p> <ul style="list-style-type: none"> - Energy - Capacity - Budget (a pre-defined budget is auctioned, not capacity, like in the Netherlands) <p>Objects can be auctioned through two main approaches:</p> <ul style="list-style-type: none"> - Single-item approach - Multi-item approach 	<p>PPA is an important policy mechanism for securing the income for the electricity generated. Also, the 15-year limit of PPAs are established to attract financing.</p> <p>In addition to PPAs, the interviews highlighted the importance of land and grid access guarantee through YEKA auctions.</p> <p>It was suggested that alternative approaches to single-item approach could also be considered.</p> <ul style="list-style-type: none"> o It is suggested that there might be a risk with the “winner gets all” approach, by which the winning consortium develops all auction capacity, that project risks might be created. For example, in case of a project failure, single-item auctions, impact on the sector might be high in single-item-auctions (e.g., the winning company closes business). o Disadvantageous conditions could emerge for small and medium local market players. <p>In October 2018, EMRA stated that the Forex-based policy mechanism might be discontinued and that institutions are carrying out research on the possibilities of establishing a Turkish Lira-based policy mechanism.</p>	<ul style="list-style-type: none"> - Extending the PPA year limit to 20 years is suggested to improve project financing options and subsequently lower the offered power purchase prices. Otherwise, the winner is suggested to be provided with additional financial (or risk mitigating) instruments. - Grid access is suggested to not only be prioritised but also guaranteed when the project sites are specified in the selected zones. - For future YEKA auctions, the transition to a multi-item auction approach with smaller capacities, rather than a single-item approach with large capacity is suggested to be continued. This would allow several investors and contractors to benefit, add value, and more easily finance projects. - It is suggested to carry out smaller auctions to meet local content requirements more easily and cost-effectively. The second onshore wind YEKA auction with 4x250 MW capacities was regarded as a good step towards achieving this goal. Much smaller (50-100 MW) auction sizes are suggested to be carried out; - For medium and small size market players and projects, <ul style="list-style-type: none"> o Bidding processes for small and medium scale project developers are suggested to be simplified, paving the way for bidding for small capacities. o Activities of small and medium scale market players are suggested to be supported. o Different policy mechanisms, such as feed-in tariffs, are suggested to be designed for small projects and different regions. <p><u>Recent developments:</u></p> <p>In October 2018, the transformation to a multi-item approach started:</p> <ul style="list-style-type: none"> - The second solar PV YEKA auction was announced to be comprised of three different items. This YEKA auction is recently canceled. - Second onshore wind YEKA auction with 4x250 MW items was announced. - It is stated by the government officials that medium and small scale YEKA auctions will be carried out. 40-50 MW of solar PV capacity installations are stated to be auctioned in every city in the country.

International Best Practices	Assessment	Recommendations for Improvement
Technology		
<p>To efficiently promote renewables in the short term, auctions should be open to all renewable technologies, considering the country's resource availability.</p> <p>If energy source diversification, and security of supply and efficiency (greater medium and long-term price reductions) are sought, technology-specific auctions should be used with quotas for each technology.</p> <p>In markets with low penetration of renewables and few players, governments tend to implement technology-specific auctions. In more mature markets with large scale project developers, governments tend to transition to multi-technology auctions.</p> <p>UAE, Morocco, and South Africa are examples of countries implementing technology-specific auctions (for wind or solar).</p> <p>Mexico implements multi-technology auctions covering all renewable energy technologies.</p> <p>In Chile auctions are technology-neutral.</p> <p>Brazil implements all types of auctions, for one specific renewable energy technology, for all renewable energy technologies, and neutral (fossil and renewable).</p>	<p>YEKA auctions are technology-specific. There has been one YEKA auction for solar PV and one for onshore wind in 2017. In 2018, one YEKA auction is announced for each of these technologies. The second onshore wind YEKA auction is planned to be carried out in 2019. The second solar PV YEKA auction is recently canceled. Another YEKA auction was announced for offshore wind, but is recently postponed to 2019.</p> <p>Turkey's primary objective is to develop the local industry; therefore, implementing technology-specific auctions is the right decision.</p>	<ul style="list-style-type: none"> - Until the market is mature enough, the current technology-specific approach is regarded as the most appropriate. After the market matures, implementing multi-technology or technology-neutral auction models are suggested to be considered. - Implementation of the YEKA auction model could also be an important opportunity to deploy enabling technologies such as battery storage, but the need for storage and the pros and cons of carrying out joint or separate auctions should be thoroughly assessed. - Implementation of the YEKA auction model could also be an important opportunity to support other renewables such as biomass, biogas, waste, and geothermal development for different uses.
Site		
<p>The importance of location differs by country and depends on factors such as country size, transmission infrastructure, available resources and their proximity to demand centres, social acceptance, and local value creation.</p> <p>To achieve economic efficiency, auctions should be site-neutral. In cases where locational distribution of projects is pursued for reasons such as avoiding congestion in the transmission network, avoiding social rejection, and maximizing rural development, specific project sites could be identified, or zoning exercises could be carried out like YEKA auctions. YEKA auctions prioritise specific areas for installation, with capacity quotas established based on the transmission infrastructure's technical parameters.</p> <p>Mexico and Uruguay announced a capacity limit on awarded electrical nodes.</p>	<p>In Turkey, high capacity factors used for the profitability of projects are limited. So, YEKA auctions prioritise specific areas for installation, with capacity quotas established based on the transmission infrastructure's technical parameters. YEKA auction zones are selected towards a compromise on connection capacity, and access to land and resources. This means that selected regions might not necessarily be the best sites in terms of energy potential.</p> <p>YEKA auctions provide support for licensing processes. Experiences in Europe show that costs increase mainly due to delays in licensing.</p> <p>Although support is provided, secure transmission of variable electricity for renewable resources is not guaranteed. On some occasions, electricity could not be purchased and integrated to the grid.</p> <p>Two major concerns were raised during the stakeholder consultation:</p> <ul style="list-style-type: none"> o For companies that were already active within YEKA auction zones, zoning might limit the possibility of connecting to the grid. o Zoning may also limit development outside YEKA auction zones, due to the uncertainty on upcoming auction zones under the YEKA auction model. <p>Although zoning is generally regarded as a best practice, it will be beneficial to incorporate region-specific location approaches.</p>	<ul style="list-style-type: none"> - It is suggested to develop a medium and long-term framework through zoning activities, announce the prioritized locations, and provide sufficient resource measurements for bidders to improve predictability. - It is suggested to guarantee expedited licensing and secure transmission of variable electricity for renewable resources auctioned under the YEKA model. - Each region in Turkey has unique conditions, advantages, and improvement points. The location model is suggested to be chosen with these factors in mind, and models are suggested to be differentiated for different auction elements. Thus, zoning model is suggested to be implemented along with a free-location model, depending on auction elements and conditions. - In order to promote investment in different regions, it is suggested to introduce premiums rather than a fixed tariffs. For example, higher PPAs are suggested to be received at lower speed locations to enhance geographical balancing of investments.

International Best Practices	Assessment	Recommendations for Improvement
Project size		
<p>Project size restrictions should be determined by external factors such as transmission grid capacity or environmental regulations, and not necessarily be mandated by the auction design.</p>	<p>In the first onshore wind YEKA auction, it was specified that in each location pre-defined in the auction, wind projects of a minimum 50 MW capacity should be developed.⁹</p> <p>There are no specifications regarding the minimum project size in other YEKA auctions.</p>	<ul style="list-style-type: none"> - Project size are suggested to be determined based on technical and resource constraints; such as resource availability, resource variability, and available transmission capacity.
Type of auction		
<p>Depending on the process, auctions can be classified into sealed-bid, dynamic, and hybrid auction models.</p> <p>Sealed-bid auction model is the most popular and easy-to-implement auction type, and has provided the optimum results so far.</p> <p>Hybrid auctions are generally used to extract value from bidders in auctions of goods with lesser-known values. Thanks to disclosed bids, it reduces the “winners’ curse effect”¹⁰ but increases risks for collusion.</p> <p>Most countries apply the sealed-bid auction approach. Besides Turkey, the hybrid approach is also observed in Brazil and China.</p>	<p>Considering that the winner will not only deploy the projects but also carry out the manufacturing activities, establish R&D facilities, and meet the mandatory local content requirements, applying the hybrid auction model enables access to more information during auction processes, and is preferable to the sealed-bid model for it presents the opportunity to better identify “real” market values, avoid overpayments, and reduce underbidding.</p> <p>Dynamic auctions like hybrid YEKA auctions are more vulnerable to implicit collusion; however, implicit collusion did not occur in YEKA auctions since they were single-item, “winner gets all” auction approaches.</p>	<ul style="list-style-type: none"> - Reverse auction method is standard procedure in this sector.
Ceiling prices		
<p>Ceiling prices are needed to avoid unexpected costs.</p>	<p>Interviews revealed that investors appreciated disclosed ceiling prices, which gives them a preliminary idea of how competitive the consortium has to be, allowing for early drop out and reducing transition costs.</p> <p>The final price was reduced by more than 50% from the ceiling price in the first onshore wind YEKA auction, suggesting that the ceiling price had been high. Nevertheless, overpayment due to a high ceiling price did not occur, thanks to the descending clock auction design.</p> <p>Technological advancements decreased ceiling prices, yet current dramatic increases in financing costs might deter investors.</p>	<ul style="list-style-type: none"> - Ceiling prices are suggested to continue to be practised and disclosed in future YEKA auctions; - Increases in financing costs and developments in technology costs are suggested to be considered while determining ceiling prices.
Requirements		
<p>To reduce underbidding</p> <p><u>for project developers:</u></p> <p>administrative, legal, and financial requirements, as well as proven experience in similar projects are often demanded to assess developers’ capacity.</p> <p><u>for projects:</u></p> <p>connection permits, resource assessments, and environmental impact assessments are often required, adapted for each technology.</p>	<p>Stakeholders did not find the expertise requirements requested in YEKA auctions stringent enough and highlighted them as a potential source of risk.</p> <p>Another expressed concern was the risks associated with the possibility of transferring the auction rights to different market players.</p>	<ul style="list-style-type: none"> - In addition to financial guarantees, pre-qualifications such as project development experience are suggested to be required. - Main guarantee and requirement conditions are suggested to focus on the capacity of bidders to realise the project in question. - Transferability of auction rights are suggested to be limited, monitored, and a clear project implementation timeline is suggested to be required.

⁹ The individual projects of up to 1 GW capacity awarded should have at least 50 MW each.

¹⁰ Winner’s curse effect is a tendency of the winning bid in a reverse auction to overpay and underbid for the intrinsic value or true worth of an item. Due to incomplete information, emotions, or any other number of factors regarding the item being auctioned, bidders can have a difficult time determining the item’s intrinsic value (Warren et. al., 2009).

International Best Practices	Assessment	Recommendations for Improvement
Guarantees		
<p>Financial guarantees are needed to avoid underbidding.</p> <p>Auctions should require bid bonds to guarantee the signature of the contract, and completion bonds to secure the construction of the project on time. The level of these guarantees clearly effect the realisation of projects.</p>	<p>YEKA auctions require both bid bonds and completion bonds.</p> <p>Stakeholders suggested to increase required guarantee levels to ensure the reliability of the bidder and the successful completion of the project, both in the first solar PV and onshore wind YEKA auctions as to compensate for potential losses in the case that the winning consortium defaults.</p> <p>Stakeholders also suggested to ensure that the bidding capacity of small and medium size enterprises is not limited by financial guarantees.</p>	<ul style="list-style-type: none"> - For the second onshore YEKA auction and the recently canceled second solar PV YEKA auction, guarantee levels were suggested to be increased to ensure the reliability of the bidder and the successful completion the project. - To facilitate diverse actor participation and regional benefits, lower financial guarantees are suggested to be developed specifically for medium and small-scale project developers.
Local content requirements		
<p>Local content requirements pursue maximising social benefits through industrial development and job creation.</p> <p>Empirical studies on the application of local content requirements to renewable energy projects show that local content requirements reduce economies of scale and thus increase project costs and electricity prices in wholesale markets.</p> <p>When making a decision to incorporate local content requirements, their level and possible evolution in time, market maturity and local industrial, human, infrastructure, and financial capacity should be considered.</p>	<p>Local content requirements are generally secondary objectives in auctions. In the case of YEKA auctions in Turkey, local industry creation and technology transfer are the primary objectives.</p> <p>Stakeholder consultations yielded much feedback on local content requirements:</p> <ul style="list-style-type: none"> - Turkey needs a sustainable renewable energy market. - Local content has its own costs and the shares required for local content needs to be reevaluated. - Comments received by investors indicate that mandatory new manufacturing facilities might be inefficient since the technology evolves very fast, and it will be difficult to promote technological dynamism in future YEKA auctions. - If the investments for manufacturing facilities are not successful, the project cannot be developed. This creates project risks. - A decrease in imported panel prices for solar PV might limit the domestic development of these technologies. 	<ul style="list-style-type: none"> - A holistic approach is suggested to be adopted for the establishment and sustainability of a domestic renewable energy sector: <ul style="list-style-type: none"> o YEKA auction model is suggested to be one of the many policy mechanisms supporting the establishment of a domestic renewable energy sector. o Local content requirements are suggested to be implemented not only in licensed production but also in others. o Local market installations in the mid and long term are suggested to be guaranteed. - Local content requirements are suggested to be tailored in a way that ensures that Turkey benefits from low international technology prices, while costs for Turkish consumers do not increase. For this purpose: <ul style="list-style-type: none"> o Local content requirements rates are suggested to be reevaluated for the needs of each project, and premiums are paid for extra local content. o Changes to local content requirements are suggested to be limited to achieve predictability. - Installation of efficient and innovative technologies are suggested to be supported with additional measures. - More specific technical requirements are suggested to be specified for the components that satisfy local content requirements. - Technology applied by local content requirements and the technology used in the field are suggested to be particularly considered in terms of compatibility. - Preventive measures are suggested to be taken to ensure the success of project realisation for cases in which the development of local manufacturing facilities is mandatory before project development. - Adequate measures are suggested to be taken, particularly in solar energy, to make sure that the decrease in imported panel prices do not become a significant factor that limits development in targeted technologies.

International Best Practices	Assessment	Recommendations for Improvement
Selection criteria for winning bids		
<p>From an economic point of view, the lowest price should be selected.</p> <p>Multi-criteria selection systems are more complex to implement and should be well-defined in advance for mitigating the perception of not being transparent.</p> <p>Most countries use the lowest price method for selecting the winning bids. South Africa is the most popular example among countries that implement a multi-criteria assessment selection system, which include social aspects.</p>	<p>Selection criterion applied in YEKA auctions was the lowest price method - a best practice.</p>	<ul style="list-style-type: none"> - Best practices are already being applied for the selection criteria for winning bids.
Establishing the final price		
<p>“Pay-as-bid” approach should be used to establish final prices. This most commonly used approach provides the bidders with the advantage of price certainty in case of winning.</p> <p>Spain is one of the few countries that applies the “marginal price” approach, where all winning bids get the same tariff as the last accepted offer. This option is not a good practice for establishing final prices.</p>	<p>YEKA auctions applied the “pay-as-bid” approach – a best practice.</p>	<ul style="list-style-type: none"> - Best practices are already being applied for establishing final prices.
Penalties		
<p>Sanctions often occur due to delays in commencing operations, and generation shortfalls. Sanctions should be made very clear to the bidder to evaluate associated risks.</p>	<p>Stakeholders found sanctions to be clear but not enough to ensure that the bidder commences operations on time and that the right amount of electricity is generated.</p>	<ul style="list-style-type: none"> - Penalties for non-compliance or delays are suggested to be increased to levels that ensure that the bidder commences operations on time and the right amount of electricity is generated.
Policy mechanisms		
<p>Additional policy mechanisms like access to land, financing, and reduced administrative processes are often offered to winning bids. These policy mechanisms should be made clear in advance to allow for the evaluation of potential discounts in bids.</p>	<p>Stakeholders highlighted access to land, transmission rights, and tailored administrative processes as policy mechanisms for YEKA auction winners. These policy mechanisms for successful project implementation are well received by market players.</p>	<ul style="list-style-type: none"> - Additional policy mechanisms provided to winning consortiums are regarded as positive practices for project implementation. - Access to transmission grids are currently prioritised. These are suggested to be guaranteed in future occasions.
Information and transparency		
<p>To attract bidders, calls are suggested to aim for maximum international publicity.</p> <p>Facilitating access to information such as administrative processes, transmission systems, and resource assessment reduces transaction costs.</p> <p>Transparency portals with information on past and ongoing auctions are suggested to be established as a best practice.</p>	<p>There is no comprehensive portal with information on past and ongoing auctions in Turkey.</p> <p>Not all zones auctioned under the YEKA model have gone through public consultation. Therefore, social acceptance issues might be encountered in some projects.</p>	<ul style="list-style-type: none"> - A portal that contains all auction information facilitating bidding in ongoing auctions (information on land, connection capacities, resource measurements, etc.) are suggested to be established. - All information from concluded auctions are suggested to be made mandatorily available. - Energy Exchange Istanbul Transparency Platform is suggested as a good exemplary portal. - To ensure social acceptance, public consultation is suggested to be pursued for all the project zones auctioned under the YEKA model.

International Best Practices	Assessment	Recommendations for Improvement
Financing opportunities		
	<p>Market players suggested that attracting funds and increasing financing opportunities through government, private sector, and national and international financing institutions are essential for the sustainability of a domestic renewable energy market.</p>	<ul style="list-style-type: none"> - It is suggested to attract international capital and investor attention for creating sustainable financing. - In order to attract international capital and investor attention, it is suggested that liquidity in the domestic currency market is increased, level of financing costs are decreased, adequacy of the bankability criteria are reevaluated, and factors in determining ceiling prices in YEKA auctions are reevaluated. - Non-recourse project financing is suggested as one of the instruments that could be used to attract international capital.
Processes		
	<ul style="list-style-type: none"> - The timeframe between the date of YEKA auction announcement and the submission deadline should be extended, considering the need to form consortiums, carry out technical and financial assessments, etc. - The main challenge of project implementation is expected to be meeting the deadlines for commencing operations. - The whole project development cycle responsibility is currently shouldered by the project developer. - There are no publicly available resource measurements. Sites in the selected zones are identified after the auction, and their measurements are expected to be shouldered by project developers. Resulting risks create upward pressure on project risk and consequently final bid prices. - The lack of resource management results in each bidder using their own resources for these measurements. Moreover, a sound and reliable resource measurement can only be carried out in a year. These factors cause resource waste, risks, and increased prices. 	<ul style="list-style-type: none"> - More time is suggested to be allowed to prepare for auction bids, which would enable project applications with better price levels. - It is suggested that there is an opportunity to provide clearer terms of reference regarding administrative processes and licensing. To exemplify, the regulatory body, EMRA, might coordinate the implementation process, while the developer is responsible for acquiring the permits. - Government institutions are suggested to take the responsibility for resource measurements, and provide measurement data for investors in exchange for a fee, if needed. This is suggested to decrease transaction costs.
Second onshore wind YEKA auction		
		<ul style="list-style-type: none"> - The adoption of multi-item approach of 4x250 MW is regarded as a positive development. - The lower ceiling prices (US\$5.5 ct/kWh) with respect to the first onshore wind YEKA auction (with US\$7 ct/kWh) is regarded to be in line with price developments. - The identification of technology specifications in the auction announcement is found as a positive development.

International Best Practices	Assessment	Recommendations for Improvement
Second solar PV YEKA auction (Recently canceled)		
	<ul style="list-style-type: none"> - At the moment, the solar panel production localisation rate is around 40-50%. There was concern that the 60% localisation rate might not be met. 	<ul style="list-style-type: none"> - Criteria regarding previous experience of bidders were suggested to be added to the auction specifications. - Precautions were suggested to be taken against the potential contradictory effect that cell efficiency technology criteria might have created on the sector in terms of addressing to only one cell technology. - Local content requirements were suggested to target panel efficiency instead of cell efficiency to increase the technological elasticity/flexibility in reaching the efficiency rates. - It was announced that for the recently canceled second solar PV YEKA auction, instead of a 1 GW auction comprised of three projects, three auctions were going to be carried out (500 MW at Şanlıurfa-Viranşehir, 200 MW at Hatay-Erzin, and 300 MW at Niğde-Bor). This was expected to ease project financing and contribute to the increasing competition in the sector. - The Energy Storage System that was included in the draft of the second solar PV YEKA auction specifications was not included in the final auction notice. Another auction for Energy Storage System was decided to be carried out, for which another roadmap was announced to be drawn. Moreover, the auction did not include conditions such as long-term R&D obligations and establishment of a factory. These, coupled with decreasing prices in panel production inputs and materials, were expected to result in significantly lower final auction prices. Also, the decrease in ceiling prices were found to be in line with the price developments in solar PV sector. - The early announcement of the auction was expected to have positive effects on attracting international investors. - The shareholders stated that their worries and recommendations were addressed after the draft auction announcement and implemented in the final YEKA announcement.

International Best Practices	Assessment	Recommendations for Improvement
Offshore wind YEKA auction¹¹ (Postponed)		
	<ul style="list-style-type: none"> - The administrative processes at offshore YEKA auctions are found to be not simple - Proposed locations for the postponed offshore wind YEKA auction are suggested to not be the most suitable in terms of wind speed and direction, water-depth, and maritime traffic, and it is suggested that they also do not meet the conditions for adequate capacity factors. Thus, the locations are not optimal in terms of wind resources. Key arguments for selecting these sites were optimizing transmission and avoiding congestion when injecting 1.2 GW in one substation. - It is suggested that due to lack of resource measurements, questions about suitability of the project locations, and high capital costs, there is more uncertainty for offshore YEKA auction bids compared to other YEKA auctions. - It is suggested that meeting local content requirements can be challenging for the postponed offshore project auction. - Turkey has not yet established a local offshore supply chain. It is suggested that logistics and localization challenges might occur for offshore supply chains, such as ship routes and vessel suppliers. - It is suggested that meeting the auction's proposed construction deadlines might be challenging. - Since Turkey has no previous experience in offshore wind energy markets and auctions, it is suggested that the ceiling price might have a direct effect on attracting investors. <p>It is suggested that it is important that offshore YEKA auction is competitive at an international level to attract technology providers / international project developers.</p>	<ul style="list-style-type: none"> - Administrative processes at offshore YEKA auctions are suggested to be simplified. - Offshore YEKA auctions are suggested to be developed over a longer period and with consultation from global offshore wind investors. - Modelling the countries who have effectively promoted offshore wind, as much information as possible are suggested be made available on the project sites. - Ambitious midterm and long-term targets for offshore wind are suggested to be specified. - Higher or no ceiling prices are suggested to be specified to make sure the offshore YEKA auction is competitive at an international level and can attract international project developers. <p><u>Recent developments:</u></p> <ul style="list-style-type: none"> - The offshore YEKA auction is postponed to 2019.

¹¹ Note that the suggestions regarding offshore wind YEKA auction is based on the stakeholder consultations regarding the offshore wind YEKA announcement of 2018.



6. Recommendations for future YEKA auctions

Turkey successfully held its first round of YEKA auctions in 2017; two 1 GW size solar PV and onshore wind projects were awarded at record prices. In 2018, the government announced three new YEKA auctions: one for onshore wind with a total capacity of 1 GW (4x250 MW), one for solar PV with a total capacity of 1 GW (500 MW, 300 MW, and 200 MW), and one for offshore wind with a total capacity of 1.2 GW. The solar PV YEKA auction is recently canceled, and offshore wind YEKA is postponed earliest to 2019. YEKA auctions are announced to play a pivotal role in the government's commitment to install more renewable energy capacity.

These advances, accompanied by the achievements under YEKDEM and pre-licence auctions, are important and promising for the development of a local manufacturing capacity, technology transfer, and establishment of a competitive domestic market for low-cost renewable energy—all in accordance with Turkey's industrial strategy. According to SHURA's grid integration study titled "Increasing the Share of Renewables in Turkey's Power System", released in May 2018, the transmission grid in Turkey can integrate a share of wind and solar energy as high as 30% by 2026—if planning starts today. The share of wind and solar PV is set to grow in the coming years as Turkey utilises more of its local resources.

The auction model is a learning process. YEKA auctions will improve as Turkey's auction design evolves, benefitting from its own and the global experience at large, and complemented by other policy mechanisms such as a post-2020 floating YEKDEM, indexed to YEKA auction cost trends and/ or a more dynamic version of the current YEKDEM and pre-licence auctions. This report is prepared in close collaboration with Turkey's energy sector stakeholders and investigates in which areas and how the YEKA auction design can be further developed to adapt to domestic conditions and market needs. For this purpose, a comprehensive literature review was carried out to identify policy mechanisms for wind and solar PV installations in Turkey and to assess the performance of YEKA auctions based on a methodology developed for the European Commission. The gaps in the elements of Turkey's auction design were identified through a comparison with the corresponding experiences in 29 other countries, and stakeholder views and recommendations were collected through a survey based on the assessment of individual components of YEKA auctions.

The suggestions in this report will assist the government's rapidly evolving YEKA auction policy model for realising the most cost-effective auction design and regulatory framework to support the creation of a sustainable renewable energy industry capable of meeting the demands of Turkey's growing energy markets and strongly positioning Turkey in the competitive global market. These suggestions aim to foster the already dynamic learning process regarding YEKA auctions among energy sector actors and help enhance the regulatory framework for this policy mechanism in a way most suitable for Turkey's unique needs and priorities. To this end, nine priority areas were identified for improving the YEKA auction design on the way to increasing renewable energy's share in Turkey in a sustainable manner. It is important to point out that the second new onshore wind and solar PV auctions that will be carried out in 2019 take into consideration some of these priority areas:

- **Consider system impacts when determining location and capacity size:** When selecting zones and capacity sizes, regional characteristics are suggested to be considered. YEKA auctions are suggested to evaluate factors beyond resource availability such as available transmission capacity, local demand, and local value creation. Different regions can offer unique and varying benefits, such as demand distribution or value creation potential.
- **Create investor confidence through regularity/periodicity:** Setting an official calendar or periodicity for YEKA auctions and/or YEKDEM with fixed and frequently recurring dates, volumes, and locations, would provide transparency and market certainty for investors is suggested. Setting up a calendar can be complemented by energy demand projections, inter-institutional cooperation and process management, and prolonged PPAs.
- **Diversify capacity size:** Carrying out multi-item auctions, instead of a large single-item auction where the winning consortium is rewarded with all auctioned capacity, is suggested as it might be the key to providing the means for sustainable market development and to supporting the diversity of actors and thereby reducing the risks associated with project failure.
- **Increase access to sustainable financing:** Attracting funds and increasing financing opportunities through governmental, private sector, and national and international financing institutions is suggested as it might be the key to a sustainable renewable energy market. One way to create sustainable financing for market players is to attract international financing. However, certain conditions need to be met for attracting international capital and investor attention, such as increased liquidity in the domestic currency market, decreased level of financing costs, reevaluated adequacy of the bankability criteria, and reevaluated factors in determining ceiling prices in YEKA auctions.
- **Ensure timely delivery of projects:** The requirements and guarantees provided by bidders, and the penalties for delays or non-implementation are suggested to be reevaluated and enforced to ensure that the winning bidder has the capacity and willingness to realise the project(s).
- **Promote technological dynamism:** Installation of efficient and innovative technologies are suggested to be supported with adequate measures so that local production is in line with the technological dynamics of the renewable energy industry. To support the diffusion of these technologies, local content requirements are suggested to favour the latest technology that will create the most added value.
- **Support the YEKA auction model with other policy mechanisms:** YEKA auction model is suggested to be supported by other policy mechanisms to meet the needs of different actors and project types. Updating YEKDEM after 2020 and indexing to YEKA auction cost trends could be an option. This would provide an additional market for small and medium-size investors and expand the geographic reach of investments, resulting in both a positive system and broader socio-economic impact.

- **Transfer learnings to other dispatchable renewable energy technologies:**
The accelerated development of the domestic renewable energy market due to YEKA auctions is suggested to be used as an opportunity to create synergies with other dispatchable technologies such as biomass and geothermal energy. YEKA auctions have been a successful tool in decreasing the costs of renewable energy technologies. This might indicate similar outcomes for other renewable energy technologies, yet it is important to note that biomass and geothermal costs depend on additional factors like feedstock price and availability, as well as geographical constraints.
- **Monitor and evaluate the effects of YEKA auctions on the domestic renewable energy market:** Renewable energy in Turkey is still at a low base in terms of total installed capacity. In addition, the market is evolving fast with technological developments, and changing costs and policies. YEKA auctions could play a central role in this rapidly evolving market. Continuous monitoring and evaluation of the impacts of YEKA auctions on the domestic renewable energy market might be crucial to ensure their cost-effectiveness in the following years. Moreover, an information and transparency portal are suggested to be established to enhance the information flow between policy makers and market players. This portal should be designed as a single gateway to access all relevant information on the past, present, and future auctions. This would increase market player confidence and reduce transaction costs for bidders.

References

- Del Río, P. et al., 2015. "Assessment Criteria for RES-E Auctions." http://auresproject.eu/sites/aures.eu/files/media/documents/assesment_criteria_october2015.pdf
- Del Río, P. & Gual, M., 2007. "An Integrated Assessment of the Feed-in Tariff System in Spain." *Energy Policy*, 35 (2007) 994-1012.
- Enerji Atlası, 2018. "Güneş Enerji Santrali (GES) Yarışma Sonuçları." <http://www.enerjiatlası.com/ges-yarisma.html> (accessed 11.15.18).
- Enerji IQ, 2018. "Haftalık Piyasa Raporu." Sayı: 2018-42 / 308 Yıl: 6
- ETKB, 2018. "Elektrik." <http://www.enerji.gov.tr/tr-TR/Sayfalar/Elektrik>
- Factor, 2017. "Renewable Energy Auctions in Latin America and the Caribbean." https://www.wearefactor.com/docs/RE_LAC.pdf
- Frankfurt School-UNEP Centre/BNEF, 2018. "Global Trends in Renewable Energy Investments 2018." <http://fs-unep-centre.org/sites/default/files/publications/gtr2018v2.pdf>
- GWEC, 2016. "Global Wind Report. Market Update 2015." https://www.gwec.net/wp-content/uploads/vip/GWEC-Global-Wind-2015-Report_April-2016_19_04.pdf
- IDB, 2014. "Promoting Geothermal Development." http://publications.iadb.org/bitstream/handle/11319/6557/IDB_Geothermal_web.pdf?sequence=2&isAllowed=y
- IEA, 2008. "Deploying Renewables." OECD/IEA, Paris.
- IEA, 2017. "World Energy Outlook 2017." OECD/IEA, Paris.
- IEA, 2018. "World Energy Investment 2018." OECD/IEA, Paris.
- Invest in Turkey, 2018a. "Turkey's Renewable Energy Market and Investment Opportunities." <http://www.invest.gov.tr/en-US/infocenter/publications/Documents/RENEWABLES.ENERGY.INDUSTRY.pdf>
- Invest in Turkey, 2018b. Teaser for 1 GW Wind RE-Zone (YEKA) Tender Package. <http://www.invest.gov.tr/en-US/infocenter/publications/Documents/RENEWABLES.ENERGY.INDUSTRY.pdf>
- IPCC, 2011. "Special Report on Renewable Energy Sources and Climate Change Mitigation." Cambridge University Press, Cambridge.
- IRENA, 2014. "Evaluating Renewable Energy Policy: A Review of Criteria and Indicators for Assessment." http://www.irena.org/documentdownloads/publications/evaluating_re_policy.pdf
- IRENA, 2015. "The Age of Renewable Power: Designing National Roadmaps for a Successful Transformation." http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA_PST_Age_of_Renewable_Power_2015.pdf
- IRENA, 2017a. "Renewable Energy Benefits Leveraging Local Capacity for Onshore Wind." <http://www.irena.org/publications/2017/Jun/Renewable-Energy-Benefits-Leveraging-Local-Capacity-for-Onshore-Wind>
- IRENA, 2017b. "Renewable Energy Benefits Leveraging Local Capacity for PV." <http://www.irena.org/publications/2017/Jun/Renewable-Energy-Benefits-Leveraging-Local-Capacity-for-Solar-PV>

IRENA, 2017c. “Renewable Energy and Jobs - Annual Review 2017.” http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/May/IRENA_RE_Jobs_Annual_Review_2017.pdf

IRENA, 2018a. “Renewable Energy Benefits Leveraging Local Capacity for Offshore Wind.” <http://www.irena.org/publications/2018/May/Leveraging-Local-Capacity-for-Offshore-Wind>

IRENA, 2018b. RESPURCE. <http://resourceirena.irena.org/gateway/dashboard/>

IRENA, 2018c. “Renewable Power Generation Cost.” http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf

IRENA, 2018d. “Renewable Energy and Jobs - Annual Review 2018.” http://irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_RE_Jobs_Annual_Review_2018.pdf

KALİ Energy Solutions, 2017. “REZ Guide for Wind Energy Investors.” Ministry of Energy and Natural Resources, Ankara. <http://gizyep.de/storage/app/uploads/public/59f/09e/0f0/59f09e0f0484c118346171.pdf>

Lucas, H. et al., 2017. “Design and Assessment of Renewable Electricity Auctions in Sub-Saharan Africa.”

ETKB, 2018. “Bakan Dönmez: ‘Milli Enerji Ve Maden Politikamız Kapsamında Ortaya Koyduğumuz Uygulamalarımıza Taviz Vermeden Devam Edeceğiz.’” <http://www.enerji.gov.tr/tr-TR/Bakanlik-Haberleri/Bakan-Donmez-Milli-Enerji-Ve-Maden-Politikamiz-Kapsaminda-Ortaya-Koydugumuz-Uygulamalarimiza-Taviz-Vermeden-Devam-Edecegiz>

Official Gazette, 14.11.2018. “Güneş Enerjisine Dayalı Yenilenebilir Enerji Kaynak Alanları Ve Bağlantı Kapasitelerinin Tahsisine İlişkin Yarışma İlanı.” <http://www.resmigazete.gov.tr/main.aspx?home=http://www.resmigazete.gov.tr/eskiler/2018/10/20181005.htm&main=http://www.resmigazete.gov.tr/eskiler/2018/10/20181005.htm> (accessed 11.14.18).

Renewables Now, 2017. “INTERVIEW - The Road Ahead After Turkey’s 1-GW Solar Tender.” <https://renewablesnow.com/news/interview-the-road-ahead-after-turkeys-1-gw-solar-tender-563012/>

Saygin, D. et al., 2018. “How Turkey Can Ensure a Successful Energy Transition.”

SHURA Energy Transition Centre, Centre for American Progress, Agora Energiewende, Istanbul, Washington, D.C., Berlin.

Sacchelli, 2016. “Social, Economic, and Environmental Impacts of Biomass and Biofuel Supply Chains.” Biomass Supply Chains for Bioenergy and Biorefining. Woodhead Publishing. pp 191-213.

TEİAŞ, 2017. “10 Yıllık Talep Tahminleri Raporu (2018-2027).” https://www.teias.gov.tr/sites/default/files/2018-02/Taleprapor_2017.pdf

TEİAŞ, 2018. “Türkiye Elektrik Sistemi Kuruluş Ve Kaynaklara Göre Kurulu Güç, Kasım 2018”. https://www.teias.gov.tr/sites/default/files/2018-12/kurulu_guc_kasim_2018.pdf

- TUREB, 2018. "Türkiye Rüzgar Enerjisi İstatistik Raporu Temmuz 2018." https://www.tureb.com.tr/files/tureb_sayfa/duyurular/2018/08/istatistik_raporu_temmuz_2018.pdf
- TÜSİAD, 2018. "Sürdürülebilir Gelecek için Sürdürülebilir Enerji: Kısa ve Orta Vadeli Öneriler Raporu 07.04.2018" <https://tusiad.org/tr/yayinlar/raporlar/item/9978-surdurulebilir-gelecek-icin-surdurulebilir-enerji-raporu>
- Verk Enerji, 2016. "2011-2017 YEKDEM RES İstatistikleri." http://www.verkenerji.com.tr/wp-content/uploads/2016/12/TR_2017-YEKDEM-RES-%C4%B0statistikleri-Verk-2016.pdf
- Warren, J. H. P.E., Samuel L. Seaman, P., 2010. The Winner's Curse and Optimal Auction Bidding Strategies. 2009 Vol. 12 Issue 2.
- Wind Power Monthly, 2017. "Top Ten Turbine Makers of 2017." <http://www.windpowermonthly.com/article/1445638/top-ten-turbine-makers-2017>
- Wind Power Monthly, 2018. "Turkey issues 2.1GW in pre-licences." <http://www.windpowermonthly.com/article/1453465/turkey-issues-21gw-pre-licences>
- Yeşil Ekonomi, 2018. "Rüzgar ve Güneşte Yeni YEKA'lar Uzerinde Çalışılıyor." <https://yesilekonomi.com/ruzgar-ve-guneste-yeni-yekalar-uzerinde-calisiliyor/> (accessed 11.14.18).

Annex A: Guiding Survey Questions

Guiding questions			
Design and Assessment of Renewable Electricity Auctions in Turkey			
Date:	Place:	Start:	End:
Discussion:			
General:			
1. General assessment of the YEKA auction, positive aspects and possible improvements.			
2. Is 1 GW-size contract call sufficient to attract project developers and manufacturers?			
On design:			
3. Did you have enough time to sufficiently prepare your bid after the call was announced? Was the call sufficiently publicised?			
4. Were the administrative processes clear? Was the information provided useful?			
5. Were the percentage of local content requirement low/realistic/ambitious?			
6. Any recommendations to improve the offered PPA?			
7. Advantages and disadvantages of site-specific auctions.			
8. Was the reverse auction process promoting reckless bids?			
9. Any comments on the ceiling price?			
10. Were financial guarantee requirements low/realistic/high?			
11. What was the impact of YEKA auction design in on the support for the administrative processes, for the connection infrastructure and land use?			
Next steps			
12. Is the 20 GW goal by 2023 reasonable?			
13. What are the main challenges in achieving this target (transmission, local content, availability of finance, etc.)?			
14. It is advisable to continue with high-volume single-item auctions?			
15. It is feasible to keep/increase the local content rules?			
16. Does the winner have a significant advantage in future calls due to the already developed manufacturing capacity?			

Annex B: Stakeholder Meeting Minutes

Targets

- YEKA auctions were developed with two main objectives: (i) overcoming the problems related to licensed investment, through development of the project zones by the state; (ii) developing a domestic renewable energy market,
- Development of the project zones by the state institutions in the first YEKA auction made taking steps towards local content development easier for the manufacturers and project developers,
- In course of time, the development of project zones is transferred to project developers, and development of a domestic renewable energy sector target gained prominence.

Side Effects

- It was pointed out that auctioning large capacities gives stakeholders the impression that it is desired to have large market players in the market,
- It was stated that financing difficulties were experienced related with auctioning of large capacities:
 - On the one hand, finding affordable financing is expected to be more difficult since the development credits and export credits do not cover the production of domestic equipment,
 - On the other hand, a financing institution is supposedly found when a project is feasible.
- The selection of undeveloped wind zones increases the project risk. This also causes problems in the preparation of proposals for large-scale capacity installations. For example, problems with the zoning permits are expected to arise,
- Large project sizes and the slowdown of projects with lower capacities negatively affect the development of the domestic subsidiary industry,
- Other licensed projects have come to a halt. Market players have been waiting for 2020 to realize the projects,
- There are some concerns about the competition in future YEKA auctions, with the anticipation that the diversity of actors will decrease,
- With the anticipation that the diversity of actors will decrease, there are questions about the sustainability of the wind turbine market related with the domestic turbine manufacturing facility, which is required to be developed by the winning consortium of first onshore YEKA auction carried out in 2017.

Calendar

- There currently is no established YEKA calendar,
- For sustainable development of a domestic renewable energy sector, establishing a calendar, created according to the energy demand projections in Turkey, while containing information on the frequency of YEKA auctions, and the underlying need for development and implementation of YEKA auctions stands out as a crucial need for predictability,
- Periodicity enables projection and investment planning for future YEKA auctions,
- Periodicity stands out as an important need to plan and maintain the validity of the resource measurements,
- Periodicity will increase the diversity of foreign players in the market,
- Establishing a calendar or periodicity is suggested to be supported by improved inter-institutional cooperation and process management.

Diversity of actors

- It is suggested that financial guarantees should be decreased, so that small and medium-sized project developers can offer bids more easily,
- In order to facilitate the bidding of small and medium-sized project developers, paving the way for bidding on small capacities is suggested.

Local content requirements

- A holistic approach and other policy mechanisms additional to YEKA auction model are suggested for the establishment of a sustainable domestic renewable energy sector,
- It is suggested to implement local content requirements not only in licensed production but also in others,
- It is suggested to pay additional premiums instead of determining local content requirements rates,
- The suggestions regarding the local content requirements rate changes are as follows:
 - Restricting the local content requirements rate changes for predictability,
 - Determining local content requirements based on the needs of that particular auction,
- Quantity of panels imported increase by the decrease in prices of solar panels. This is accompanied by the increase of local content not in the domestically produced panels but the materials used with these panels. This situation is underlined as a factor that might limit the desired development in the intended technologies by local content requirements,
- Local content requirements rates are suggested to target panel efficiency instead of cell efficiency. This is suggested to increase the technological flexibility in reaching the efficiency rates,
- It is suggested to particularly consider the compatibility between the targeted technology by local content requirements and the technology used in the projects.

Ceiling price

- Technological advancements have had a decreasing effect on ceiling prices. However, this is decoupled with dramatic increases in financing costs, which might have negative effects in attracting investors. It is suggested that increases in financing costs are taken into consideration while determining ceiling prices in the future YEKA auctions.

Processes

- It was pointed out that the project developers would be fully responsible for the project development processes,
- The lack of resource managements results in each bidder using own resources for the measurements. A sound and reliable resource measurement can only be carried out in 1 year. These factors result in waste of resources, creates project risks and thus increase final prices,
- Government institutions are suggested to take the responsibility for the resource measurements, and to provide the measurement data to the project developers, for a fee if needed. This is suggested to decrease the energy transition costs,
- It was pointed out that in the previous YEKA auctions the time allocated for the preparation of the bids was not adequate to form the consortiums.

Location

- The integration of electricity generated from renewable energy sources, such as wind and solar, is currently not guaranteed. There are cases of the electricity produced could not be purchased due to problems in the grid,
- In order to improve predictability, it is important to define a medium and long-term framework by performing zoning activities, provide information about these zones and provide adequate measurements to bidders,
- Different regions in Turkey have different conditions, advantages and improvement points. It is suggested to choose the location model keeping these factors in mind. The location models should be differentiated in terms of different auction elements. For example, a free-location approach can simultaneously be used with zoning model, in different regions, differentiated for different regional characteristics.

Distributed generation

- Distributed generation technologies and applications are suggested to be supported by different policy mechanisms until they can manage on their own,
- It is suggested that there is a need for a legislation regarding hybrid generation. This regulations is suggested to regulate the self-consumption of solar energy processes of thermal and geothermal power plants.

Second Solar PV YEKA Auction

- In the second solar PV YEKA auction, it is suggested to adopt a multi-item auction model; thus, carry out different auctions in different locations, decrease the capacity to be auctioned and increase the number of auctions,
- It is suggested to add criteria regarding previous experiences to the auction specifications,
- Precautions are suggested to be taken against the probability of the contradictory effect that cell efficiency technology criteria might create on the sector in terms of targeting only one cell technology,
- Currently there is no local capacity to meet 51% local content requirements in Energy Storage System (ESS) criterion in Turkey,
- Currently, solar panel production local content rate is around 40-50%. This rate is not sufficient to meet 60% local content requirements rate,
- It is suggested that there should be a separate YEKA auction for Energy Supply Storage.

Power Purchase Agreement (PPA) & object of auction

- It is suggested to adopt multi-item auction approach rather than one-item auction.

Technology

- The use of technology-specific approach is suggested as being the best approach. It is suggested that technology-neutral auction model can be implemented after the market matures.

Information and transparency

- It is suggested that an information portal is needed,
- This portal is suggested to contain all the auction information (information related with land, measurements, etc.), and it is suggested to make all the information from past auctions mandatorily available,
- EXIST Transparency Platform is suggested as a good portal example.

Guarantees

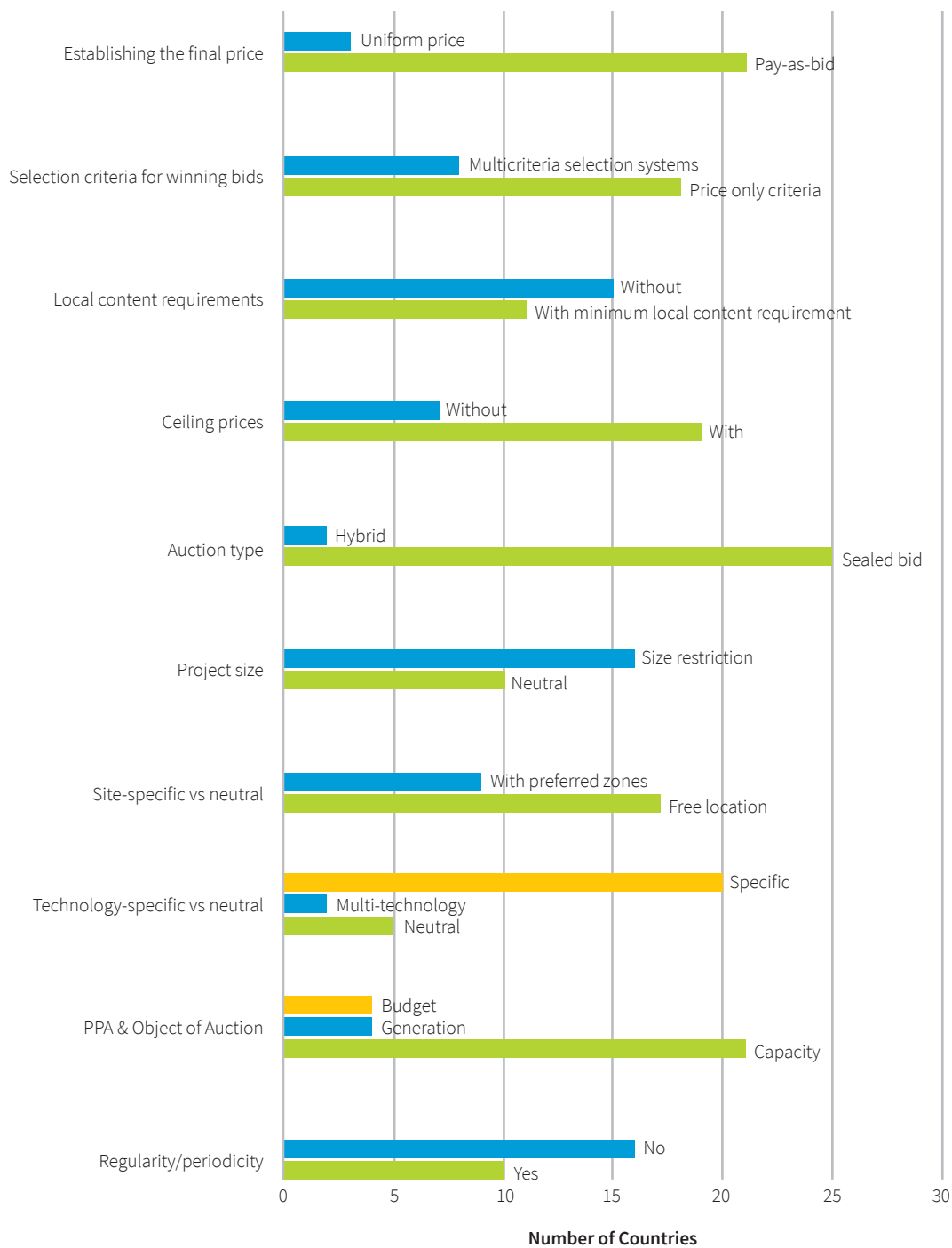
- It is suggested to increase the guarantee levels both in solar PV and onshore wind YEKA auctions to the level that they create sufficient access barriers to compensate for the losses that might occur if winning consortium defaults the implementation of the project,
- Transferability of auction rights is stated to create project risks,
- Main guarantee and requirement is suggested to be the capacity of bidders to realise the projects,
- In addition to financial guarantees, pre-qualifications such as project development experience are suggested to be required.

Offshore wind YEKA auction

- The processes of offshore YEKA auctions are not found to be simpler than other YEKA auctions,
- YEKA auction is evaluated as having many uncertainties such as location and CAPEX,
- It is pointed out that the chosen project zones are not suitable in terms of wind, water-depth and maritime traffic, and it is suggested that these parameters do not meet the conditions for adequate capacity factors,
- It is suggested that there are questions regarding the lack of an offshore wind supply chain. Also, there are uncertainties about localization possibilities of these supply chains, such as ship routes and vessel suppliers,
- It is stated that the ceiling prices defined during the YEKA auction might have negative effects in attracting investors, and the YEKA auction does not have a high competitive advantage in international level for the technology providers / project developers. It is suggested that the attraction of international project developers can be drawn through specifying higher or no ceiling prices,
- It is suggested to have a longer preparation period for the project development. Also, it is suggested to consult global offshore wind investors in the auction development processes.

Annex C: Worldwide distribution of auction design elements

Figure 2: Worldwide distribution of auction design elements



NOTES

About Istanbul Policy Center at the Sabanci University

Istanbul Policy Center (IPC) is a global policy research institution that specializes in key social and political issues ranging from democratization to climate change, transatlantic relations to conflict resolution and mediation. IPC organizes and conducts its research under three main clusters: The Istanbul Policy Center–Sabancı University–Stiftung Mercator Initiative, Democratization and Institutional Reform, and Conflict Resolution and Mediation. Since 2001, IPC has provided decision makers, opinion leaders, and other major stakeholders with objective analyses and innovative policy recommendations.

About European Climate Foundation

The European Climate Foundation (ECF) was established as a major philanthropic initiative to help Europe foster the development of a low-carbon society and play an even stronger international leadership role to mitigate climate change. The ECF seeks to address the “how” of the low-carbon transition in a non-ideological manner. In collaboration with its partners, the ECF contributes to the debate by highlighting key path dependencies and the implications of different options in this transition.

About Agora Energiewende

Agora Energiewende develops evidence-based and politically viable strategies for ensuring the success of the clean energy transition in Germany, Europe and the rest of the world. As a think tank and policy laboratory, Agora aims to share knowledge with stakeholders in the worlds of politics, business and academia while enabling a productive exchange of ideas. As a non-profit foundation primarily financed through philanthropic donations, Agora is not beholden to narrow corporate or political interests, but rather to its commitment to confronting climate change.



Evliya Çelebi Mh. Kiblezade
Sk. Eminbey Apt. No:16 K:3 D:4
34430 Beyoğlu / İstanbul
Tel: +90 212 292 49 39
E-mail: info@shura.org.tr
www.shura.org.tr

SHURA is founded by

İPM | IPC İSTANBUL POLİTİKALAR MERKEZİ
SABANCI ÜNİVERSİTESİ KAMPUSU
İSTANBUL POLICY CENTER
AT SABANCI ÜNİVERSİTESİ

