Auctions to support renewable energy deployment
Design Elements and Tradeoffs
10 May 2018
Auctions Strengths and weaknesses - Keeping pace with rapidly decreasing costs

**Auctions**

- **Strengths**
  - Flexibility in the design according to conditions and objectives
  - Permit real price discovery
  - Provide greater certainty regarding prices and quantities
  - Enable commitments and transparency

- **Weaknesses**
  - Are associated with relatively high transaction costs for both developer and auctioneer
  - Risk of underbuilding and delays

*Based on REN21 Global Status Report (2005 to 2016)*
Auctions Strengths – Potential for real price discovery

Average prices resulting from auctions, 2010-2016

- Solar energy was contracted at a global average price of almost USD 250/MWh in 2010, compared with the average price of USD 50/MWh in 2016.
- Wind average prices have also fallen from USD 80/MWh in 2010 down to USD 40/MWh in 2016.

Estimated installation costs of utility-scale PV projects: global versus auction winners, 2010-2016

- The average installation costs of projects awarded from auctions are consistently lower than global average installation costs.
Price trends: solar PV auctions
Price trends: onshore wind auctions
Renewable Energy Auctions

Recent highlights

CANADA (ONTARIO)
- 293.5 MW Wind at 46.9 USD/MWh
- 140 MW Solar at 43.1 USD/MWh
- 15.5 MW Hydro at 45.7 USD/MWh

UNITED STATES OF AMERICA
- 26 MW Solar at 37 USD/MWh

MEXICO
- 394 MW Wind at 55.3 USD/MWh
- 1691 MW Solar at 43.1 USD/MWh

BRAZIL
- 292 MW Wind at 44.28 USD/MWh
- 64 MW Wind at 30.62 USD/MWh
- 25 MW Biomass at 54.4 USD/MWh
- 10 MW Small Hydropower at 55.5 USD/MWh

ARGENTINA
- 800 MW Offshore Wind at 60.3 USD/MWh
- 340 MW Solar at 35.3 USD/MWh

SOUTH AFRICA
- 1400 MW Wind at 69.3 USD/MWh
- 210 MW Wind at 74.2 USD/MWh

TAIWAN
- 35 MW Solar at 55.85 USD/MWh
- 21 MW Small Hydro at 98.89 USD/MWh
- 15 MW Landfill Biogas at 120.18 USD/MWh

UNITED KINGDOM
- 320 MW Wind at 85.9 USD/MWh
- 150 MW Biomass at 98.18 USD/MWh

IRELAND
- 1000 MW Solar at 69.9 USD/MWh
- 210 MW Offshore Wind at 60.3 USD/MWh

ITALY
- 1000 MW Solar at 69.9 USD/MWh
- 210 MW Offshore Wind at 72.2 USD/MWh

TURKEY
- 1000 MW Wind at 69.9 USD/MWh
- 2130 MW Offshore Wind

SOUTH KOREA
- 1400 MW Wind at 69.9 USD/MWh
- 210 MW Wind at 74.2 USD/MWh

CHINA
- 6800 MW Solar at 71.4 USD/MWh
- 250 MW Offshore Wind at 53 USD/MWh
- 1000 MW Offshore Wind at 40 USD/MWh

INDIA
- 500 MW Offshore Wind at 40 USD/MWh

Countries in the G20 that have awarded renewable energy auctions in 2016 and 2017.

~ Indicates average price resulting from auction.

The term “country” as used in this material also refers, as appropriate, to territories or areas.

* Price undisclosed at time of auction.
Factors that impact the price

**Country-specific conditions**
- Potential of renewable energy resources
- Finance costs
- Installation and building costs (land, labour, energy, etc.)
- Ease of access to equipment
- Foreign exchange rates
- Fiscal and labour legislation

**Investor confidence and learning curve**
- Credibility of the off-taker and additional guarantees
- Design of the auction (regularity of auctions and remuneration profile)
- Presence of a stable and enabling environment that is conducive to market growth

**Policies supporting renewables**
- Renewable energy targets and programmes
- Regulatory instruments
- Fiscal incentives
- Grid access rules
- Policies to facilitate access to finance
- Policies to promote socio-economic benefits

**Auction design**
- Auction demand (auctioned volume, technologies, project sizes)
- Qualification requirements
- Winner selection method and criteria
- Sellers’ liabilities (compliance rules, remuneration profile, distribution of financial and production risks)

**Price resulting from an auction**
Factors that impact the price

Country-specific conditions:
- Cost of finance (access to finance, ease of doing business)
- Cost of labor, cost of land, etc.
- Renewable energy resource availability

Solar prices in France and Germany: actual results vs. adjusted result

Source: based on data from BNEF, 2016.
Factors that impact the price

Investor confidence and learning curve:
- Credibility of off-taker and guarantees
- Periodicity of auctions (as part of a long-term plan)
- Confidence from past auctions
- Lessons learnt from past auctions (auctioneer and bidders)
- Reuse of documents/studies from past rounds

Energy payment and termination guarantees in Argentina’s RenovAR programme

Source: MINEM, 2016.
Factors that impact the price

Policies and measures for RE development

- National plans and targets
- Fiscal incentives (tax credits, exemptions etc.)
- Grid access and priority dispatch
- Socio-economic benefits

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Price resulting from an auction
Price trends: USA

Lower prices in the United States

♦ Investment tax credit, the federal solar tax credit, reduces the cost of installation by about 30%.

US solar prices: actual vs. estimated effective prices, February 2013-May 2016

Source: based on data from Shahan, 2016.
Factors that impact the price

The design of the auction considering trade-offs:
- Ensuring project delivery and price
- Fulfilling development goals and price
- Encouraging small/new players and price

Country-specific conditions
Investor confidence & learning curve
Policies supporting renewables
Auction design

Price resulting from an auction

Choice of the auctioned volume and the way it is shared between different technologies and project sizes

Minimum requirements for participants in the auction

How the information is collected and the winner is selected

Auction demand
Winner selection

Qualification requirements
Sellers’ liabilities

♦ Ensuring project delivery and price
♦ Fulfilling development goals and price
♦ Encouraging small/new players and price

Policies supporting renewables

Sellers’ liabilities
Specific rules to ensure high implementation rate of awarded projects in a timely manner

Country-specific conditions

Auction design

Investor confidence & learning curve

I.REN A
International Renewable Energy Agency

IRENA and CEM, 2015
Price trends: solar PV in South Africa

Downward trends in South Africa

- Investor confidence and learning curve
- Design of the auction
- Existing domestic solar industry

Local content requirements and achievements in South Africa

Source: Submitter, Montmasson-Clair, and Das Nair (2015).
Price trends: solar PV in India

**Ups and downs in India**

- Auctions are decentralized (national and state level) with diverse conditions
- Domestic content requirements in some state auctions
- Relatively higher prices compared with Peru, the United States and South Africa

**India’s actual and adjusted solar prices, 2010-2017**

**The effect of inflation indexing on contract price**

Sources: Based on BNEF (2016); Bridge to India (2017); Elizondo-Azuela et al. (2014); MNRE (2010) and MNRE (2012).
Price trends: solar PV in the UAE

**Price results in the United Arab Emirates**

- Abundant solar resources and favorable economic conditions
- Ownership structure
- Auction design (project size, project specificity, grid connection)

![Graph showing price trends in the UAE](image)

**Remuneration profile in Abu Dhabi**

- Energy delivered from June to September counts for 1.6 times as much as energy delivered from October to May
- Therefore, the bids do not reflect the actual remuneration of the project.

![Graph showing remuneration profile in Abu Dhabi](image)

Source: based on data from BNEF, 2016.
**Price trends: onshore wind in Mexico**

*A sharp decrease in Mexico*

- Investor confidence and learning curve
- Economic signals for project location

**Locational signals and offered capacity in each location:** first vs. second Mexican auction

*Source: based on Strategy &, 2016.*
Price trends: onshore wind in Brazil

**Fluctuating prices in Brazil**

- Project lead times
- Intensified competition
- Availability of concessional financing
- Depreciation of the local currency
- Auction design

*Source: based on ANEEL, 2016*
Key considerations in designing and implementing auctions
Trade-offs in Auction Demand

Technology development and cost-efficiency
- Introducing a technology in the electricity mix (technology-specific)
- Identifying most cost-efficient technology (technology-neutral)

Schedule of regular auction or standalone
- Increasing market confidence with a fixed schedule
- Adjusting designs or ensuring fast supply through standalone auctions

Guarantees to increase off-take credibility
- Increasing investor confidence with government guarantees
- Passing the risks on to the consumers
Key considerations in designing and implementing auctions

Trade-offs in Qualification Requirements

**Permitting and documentation**
- Demanding to ensure timely project completion and delivery
- Transaction costs result in higher prices

**Extensive track record and financial capability**
- Demanding to ensure project delivery as per the bid
- Limits participation to traditional and large players

**Ensuring global socio-economic development goals**
- Ambitious to maximize domestic benefits
- Higher prices on the short term
Key considerations in designing and implementing auctions

Trade-offs in Winner Selection

**Winner selection criteria**
- Based on price only results in cost-efficiency
- Based on other objectives (location, benefits, etc.) can result in higher price

**Ceiling price**
- Lower ceiling price can ensure low prices
- Suboptimal and can lead to rejection of reasonable bids

**Project size**
- No limits on the size can lead to low prices through economies of scale
- Size limits diversify portfolio of generators and reduce risks
Key considerations in designing and implementing auctions
Trade-offs in Sellers’ Liabilities

Currency, inflation and production risks

- Limit developer risks to reduce prices
- Risks would be passed on to the off-taker

Compliance rules

- Reduced to encourage participation and increase competition
- Risks of underbidding and delays
The way forward in planning and designing auctions

- Understanding the reasons behind the low prices is important to make informed policy choices.

- Auctions may underestimate the true costs of renewable energy (e.g. balancing costs) or lead to overly aggressive bidding.

- Risks of underbuilding and delays can be reduced with solid contracts and penalties. Stringent compliance rules may deter the participation of small and new players.

- The extent to which the results are affected depends on choices regarding the design elements and how well adapted they are to the country’s specific context (economic situation, maturity of the power market and level of deployment).

- The complex and dynamic environment of renewable energy auctions motivates constant innovation in the mechanisms’ design.

- The value of renewable energy goes well beyond the energy services it provides. Therefore, trade-offs between cost competitiveness and other development objectives (such as jobs, industry development) should be carefully examined.
Download IRENA reports on Auctions

www.irena.org/REAuctions

Thank you!