

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

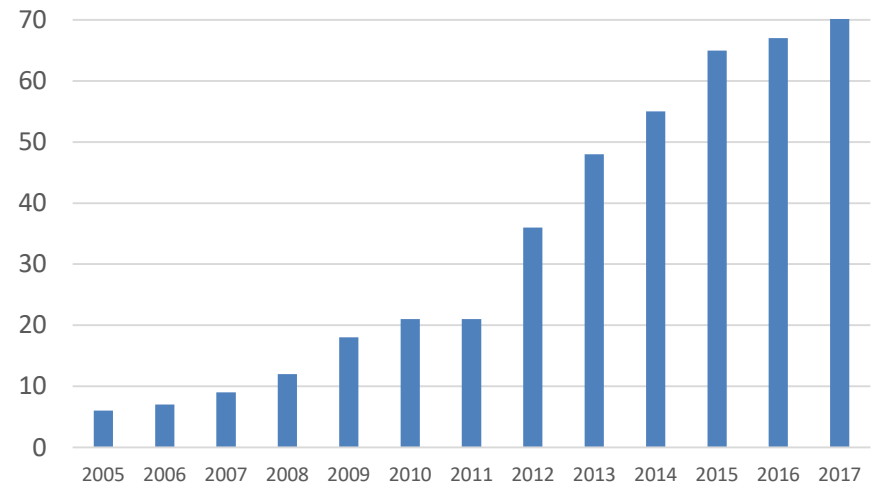
Enable commitments and transparency

Weaknesses

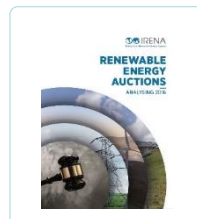
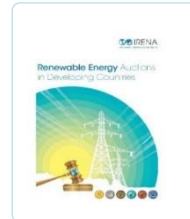
Are associated with relatively high transaction costs for both developer and auctioneer

Risk of underbidding and delays

Number of countries that have adopted auctions

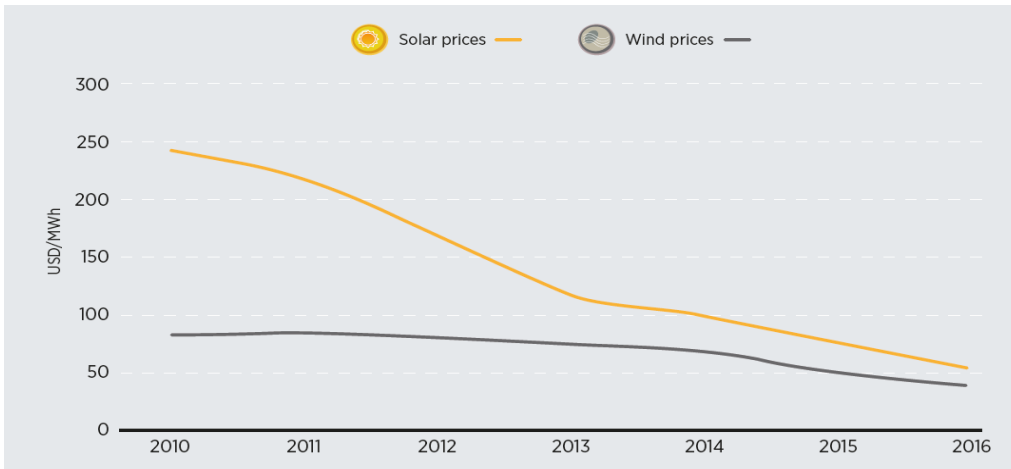


Based on REN21 Global Status Report (2005 to 2016)



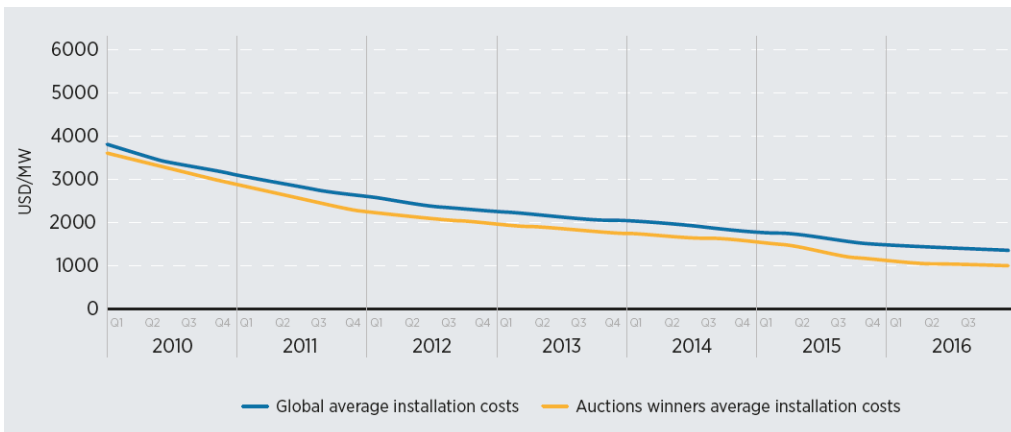
Auctions Strengths – Potential for real price discovery

Average prices resulting from auctions, 2010-2016



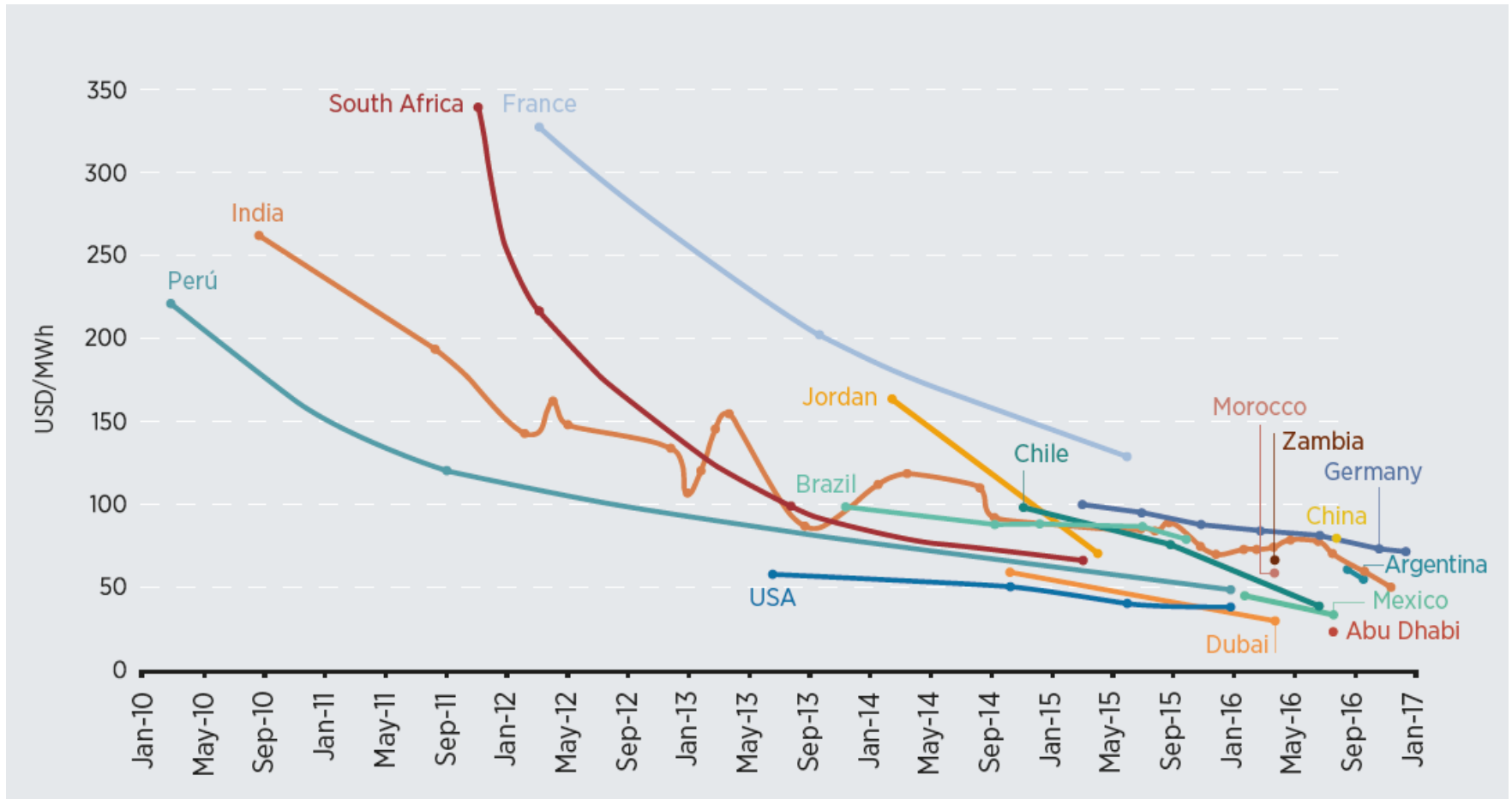
- Solar energy was contracted at a global average price of almost USD 250/MWh in 2010, compared with the average price of USD 50/MWh in 2016.
- Wind average prices have also fallen from USD 80/MWh in 2010 down to USD 40/MWh in 2016.

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

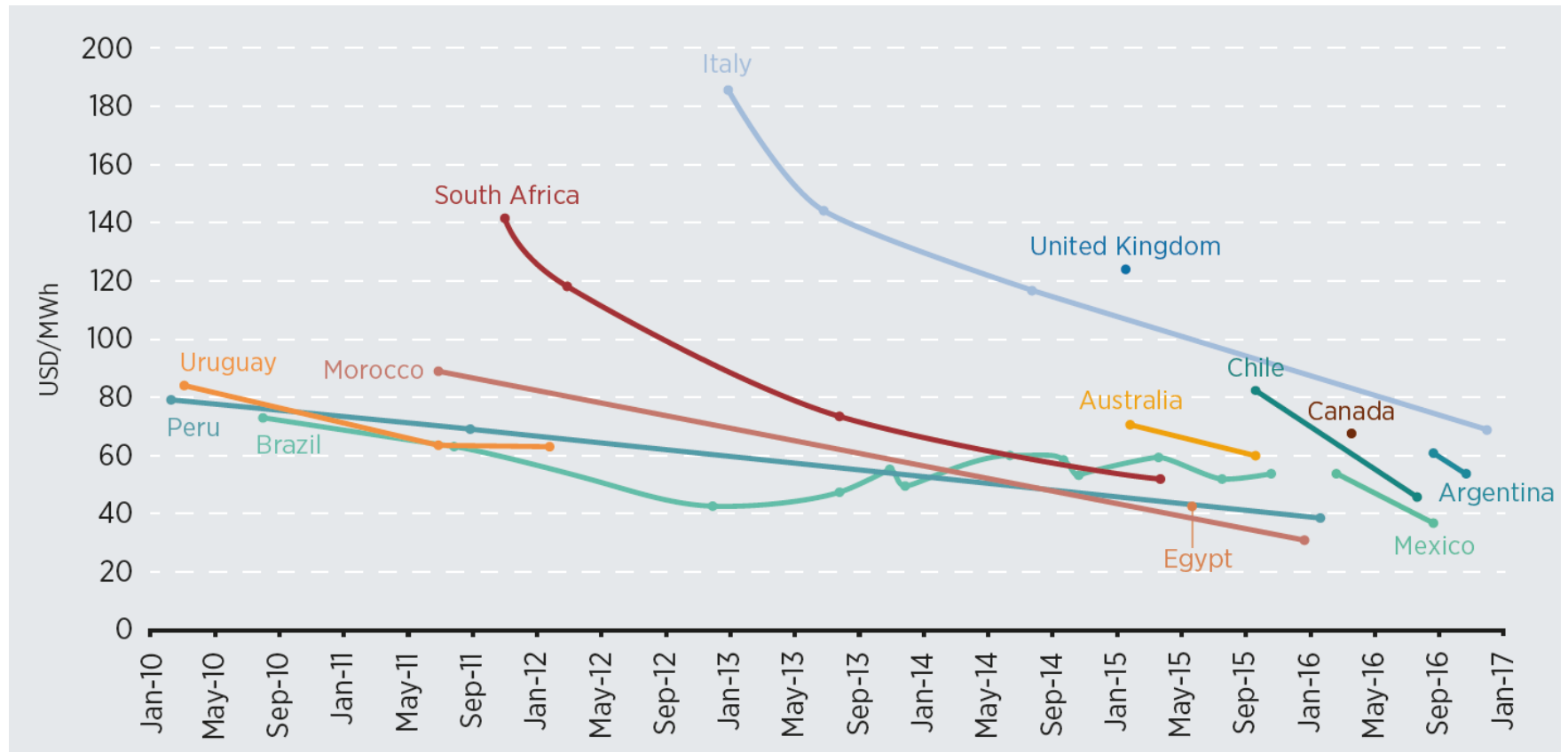


- The average installation costs of projects awarded from auctions are consistently lower than global average installation costs.

Price trends: solar PV auctions



Price trends: onshore wind auctions

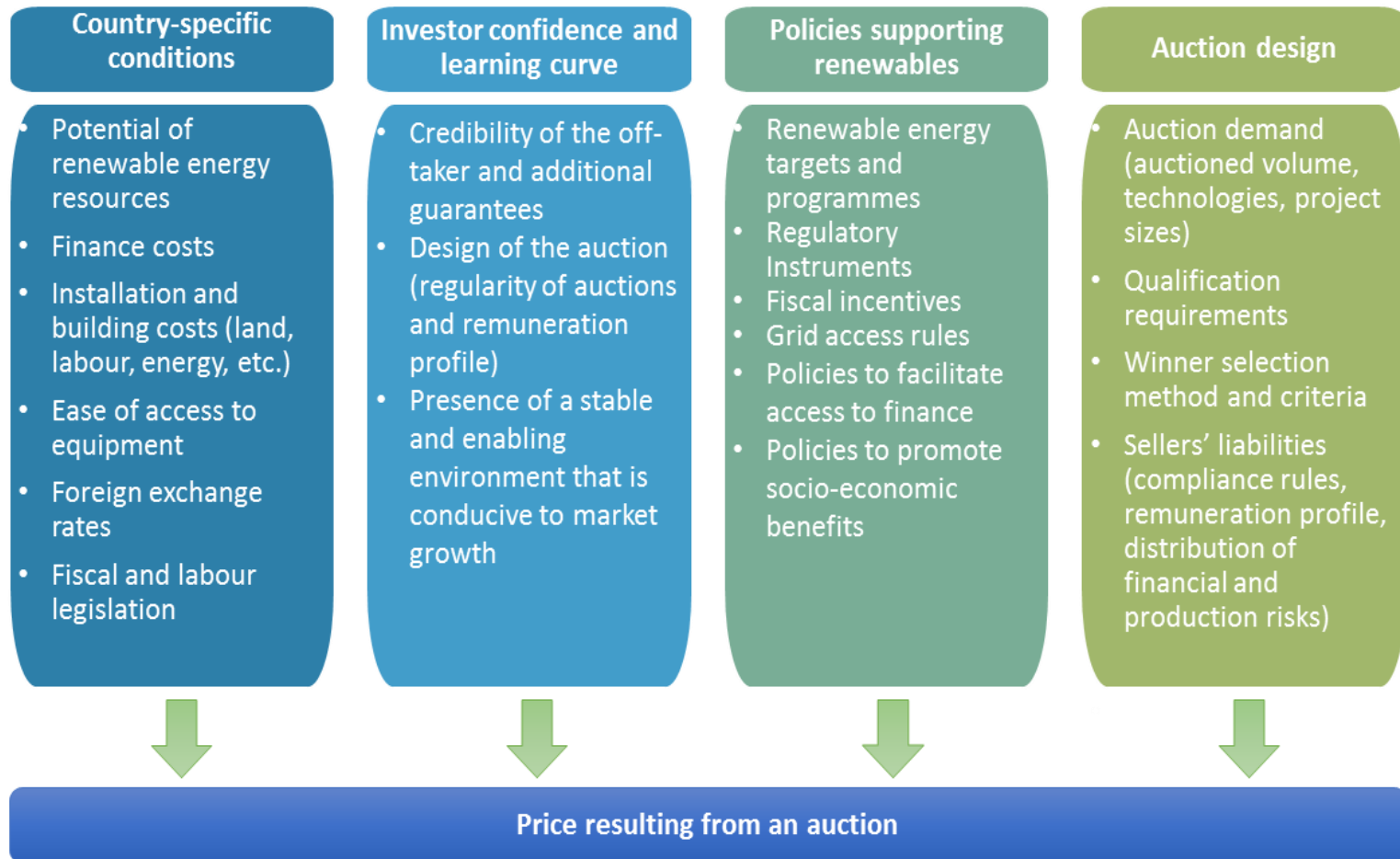


Renewable Energy Auctions

Recent highlights



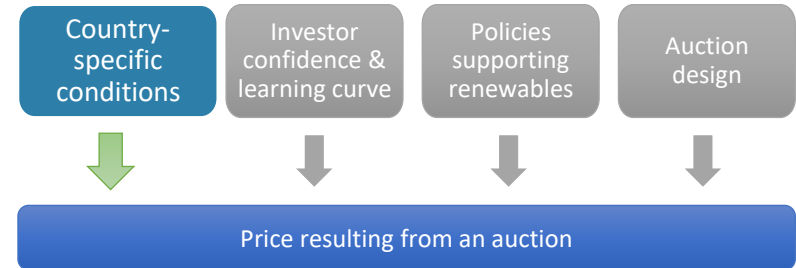
Factors that impact the price



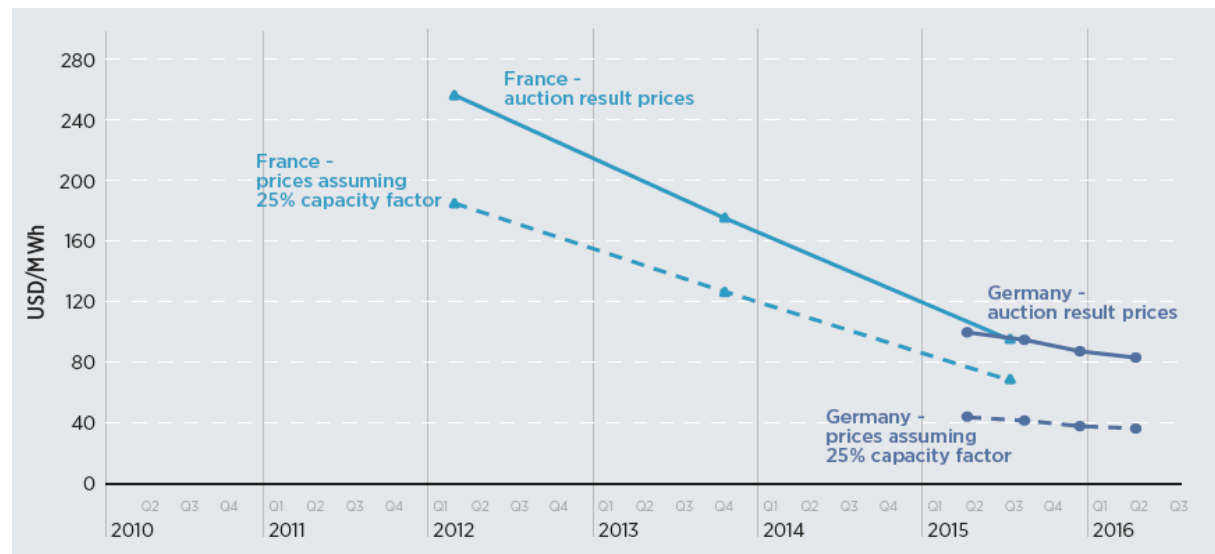
Factors that impact the price

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

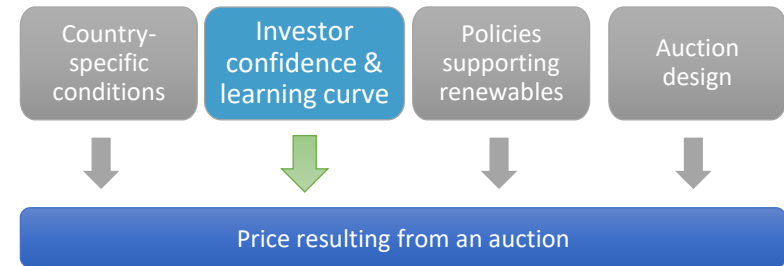


Source: based on data from BNEF, 2016.

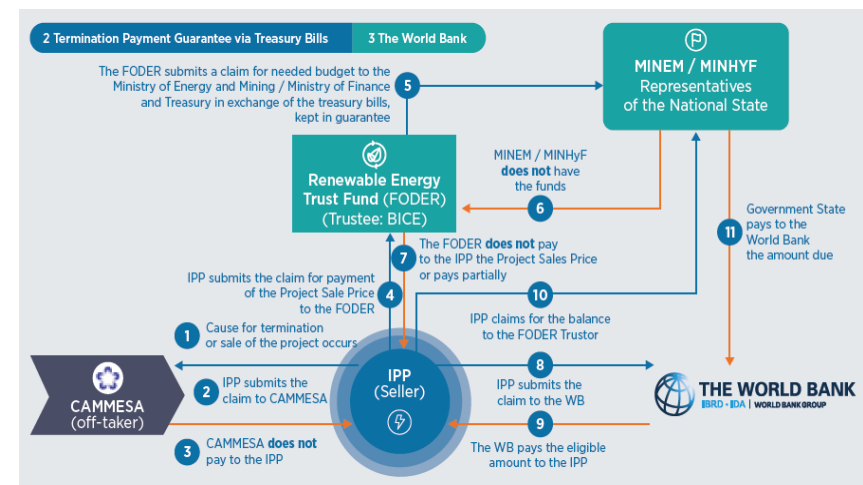
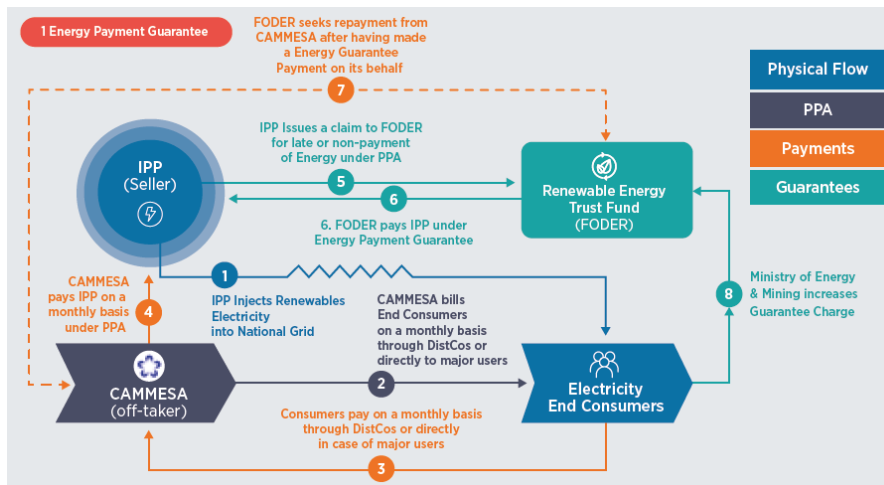
Factors that impact the price

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



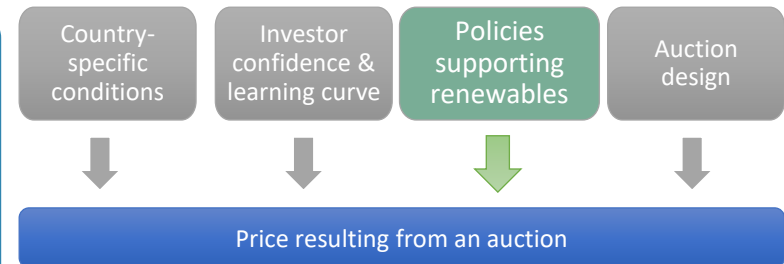
Energy payment and termination guarantees in Argentina's RenovAR programme



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



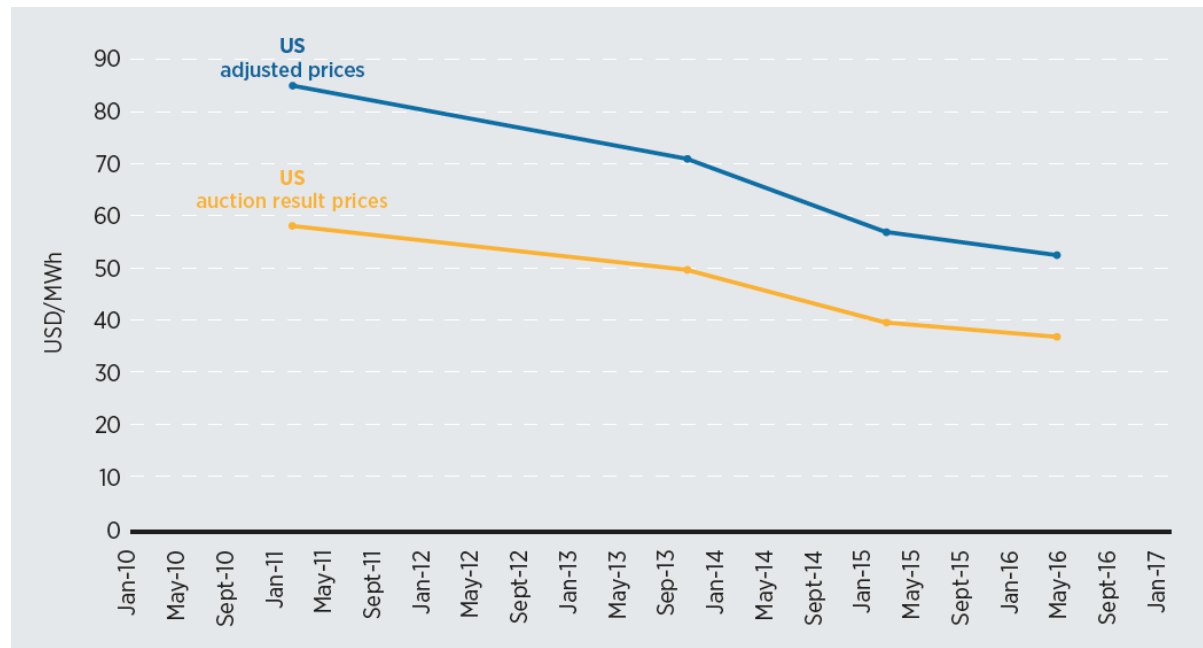
NATIONAL POLICY	REGULATORY INSTRUMENTS	FISCAL INCENTIVES	GRID ACCESS	ACCESS TO FINANCE ^a	SOCIO-ECONOMIC BENEFITS ^b
◆ Renewable energy target ◆ Renewable energy law/strategy ◆ Technology-specific law/programme	◆ Feed-in tariff ◆ Feed-in premium ◆ Auction ◆ Quota ◆ Certificate system ◆ Net metering ◆ Mandate (e.g., blending mandate) ◆ Registry	◆ VAT/ fuel tax/ income tax exemption ◆ Import/export fiscal benefit ◆ National exemption of local taxes ◆ Carbon tax ◆ Accelerated depreciation ◆ Other fiscal benefits	◆ Transmission discount/ exemption ◆ Priority/ dedicated transmission ◆ Grid access ◆ Preferential dispatch ◆ Other grid benefits	◆ Currency hedging ◆ Dedicated fund ◆ Eligible fund ◆ Guarantees ◆ Pre-investment support ◆ Direct funding	◆ Renewable energy in rural access/cook stove programmes ◆ Local content requirements ◆ Special environmental regulations ◆ Food and water nexus policy ◆ Social requirements

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

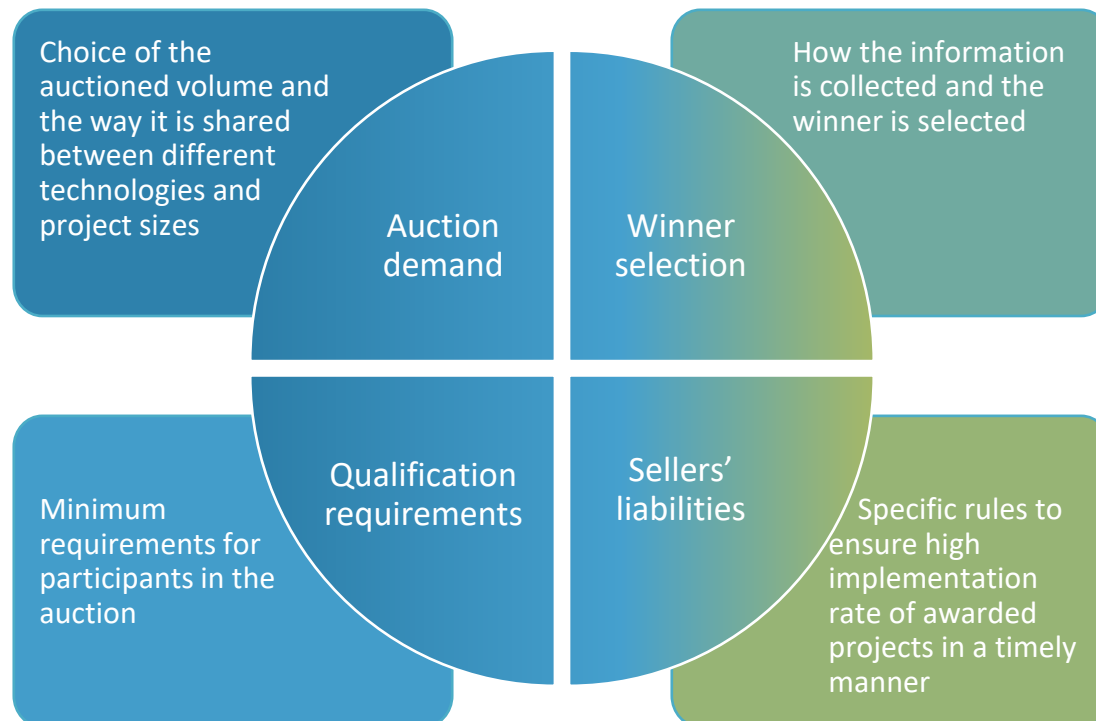
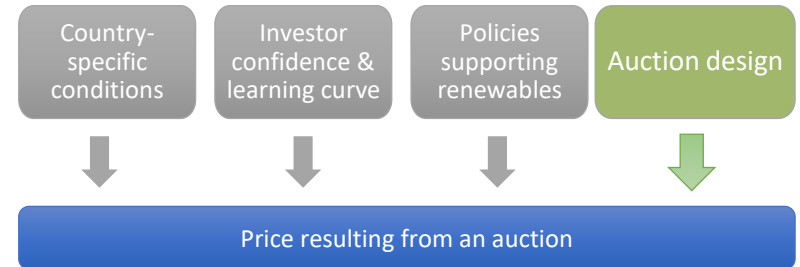


Source: based on data from Shahan, 2016.

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

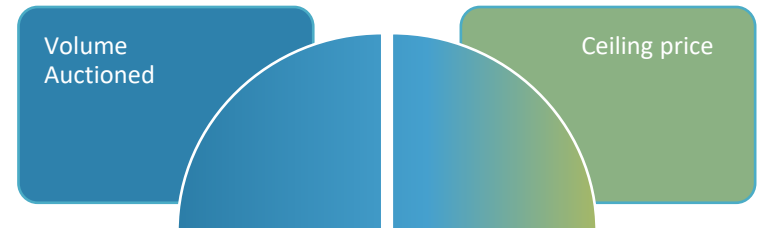


Price trends: solar PV in South Africa

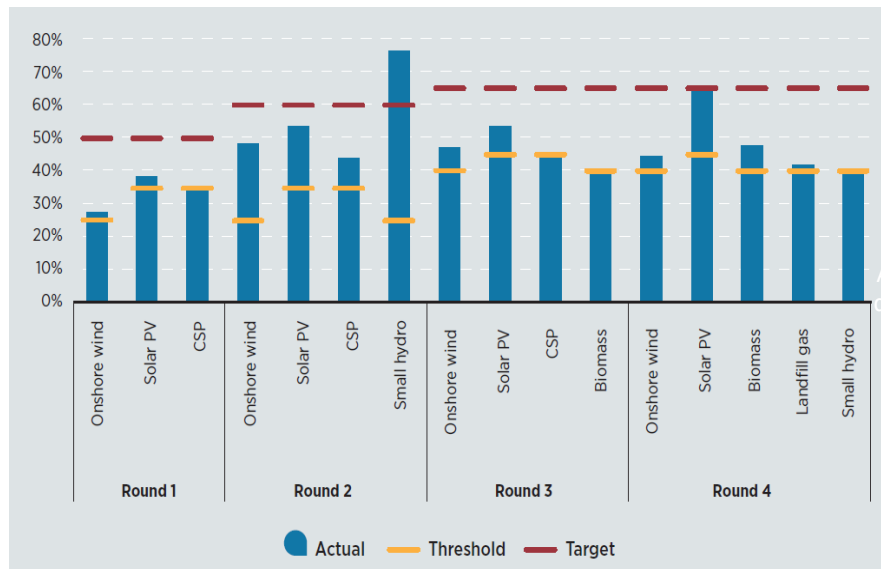
Downward trends in South Africa

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

Auction Design



Local content requirements and achievements in South Africa



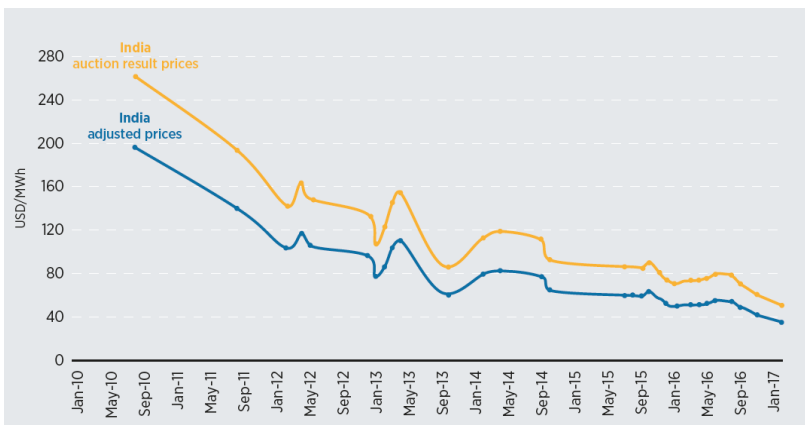
Source: Submitter, Montmasson-Clair, and Das Nair (2015).

Price trends: solar PV in India

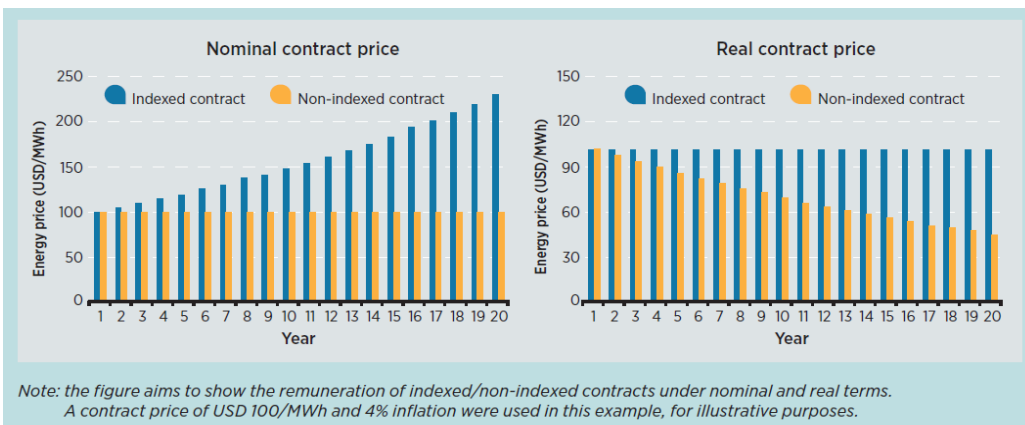
Ups and downs in India

- ◆ 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

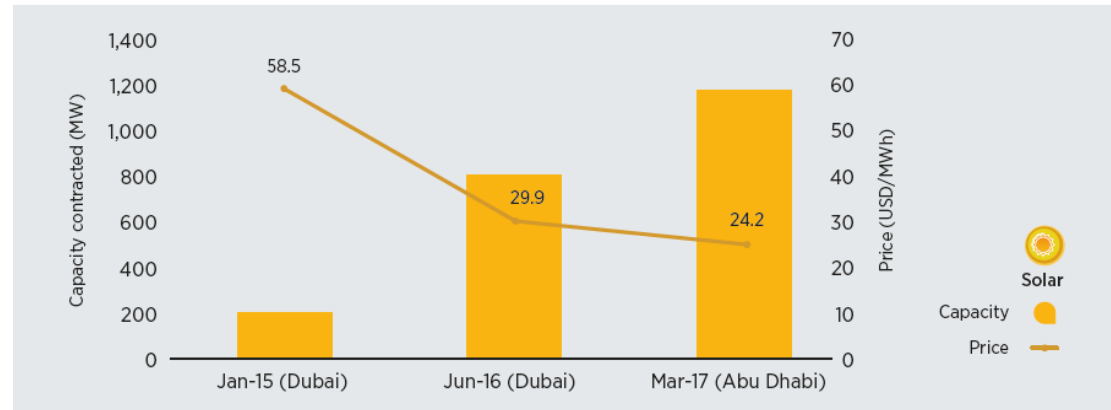


Sources: Based on BNEF (2016); Bridge to India (2017); Elizondo-Azuela et al. (2014); MNRE (2010) and MNRE (2012).

Price trends: solar PV in the UAE

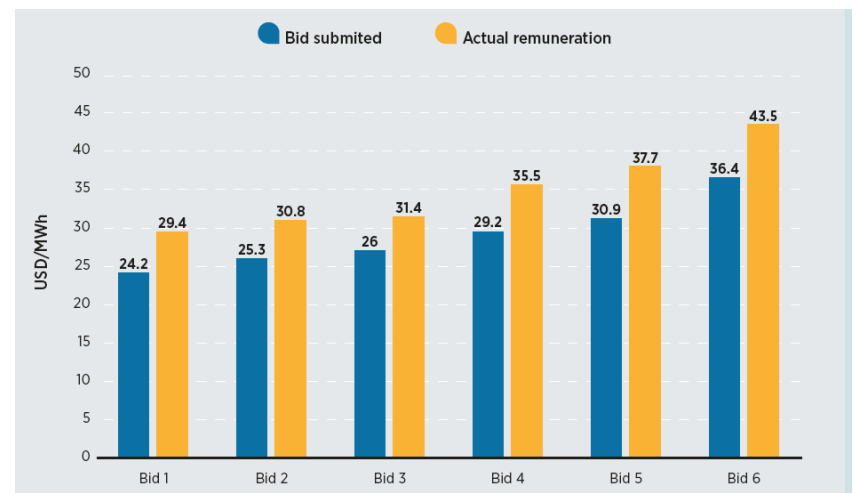
Price results in the United Arab Emirates

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



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.



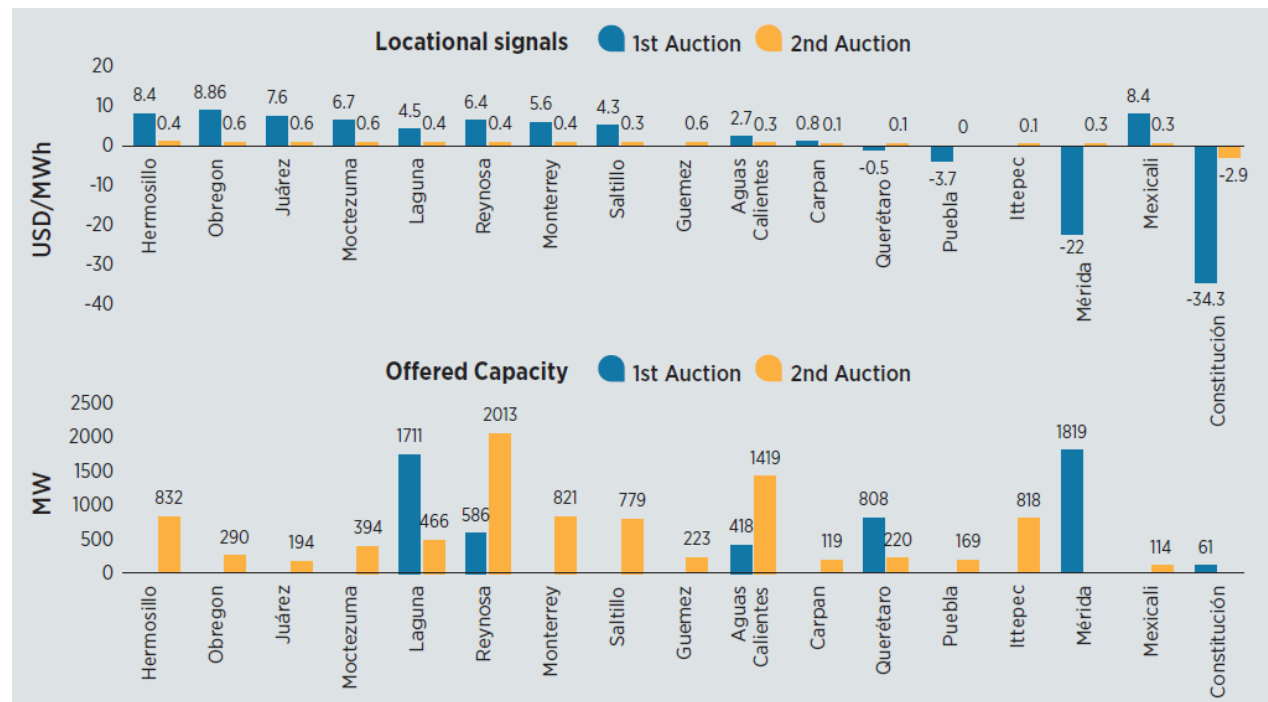
Source: based on data from BNEF, 2016.

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*

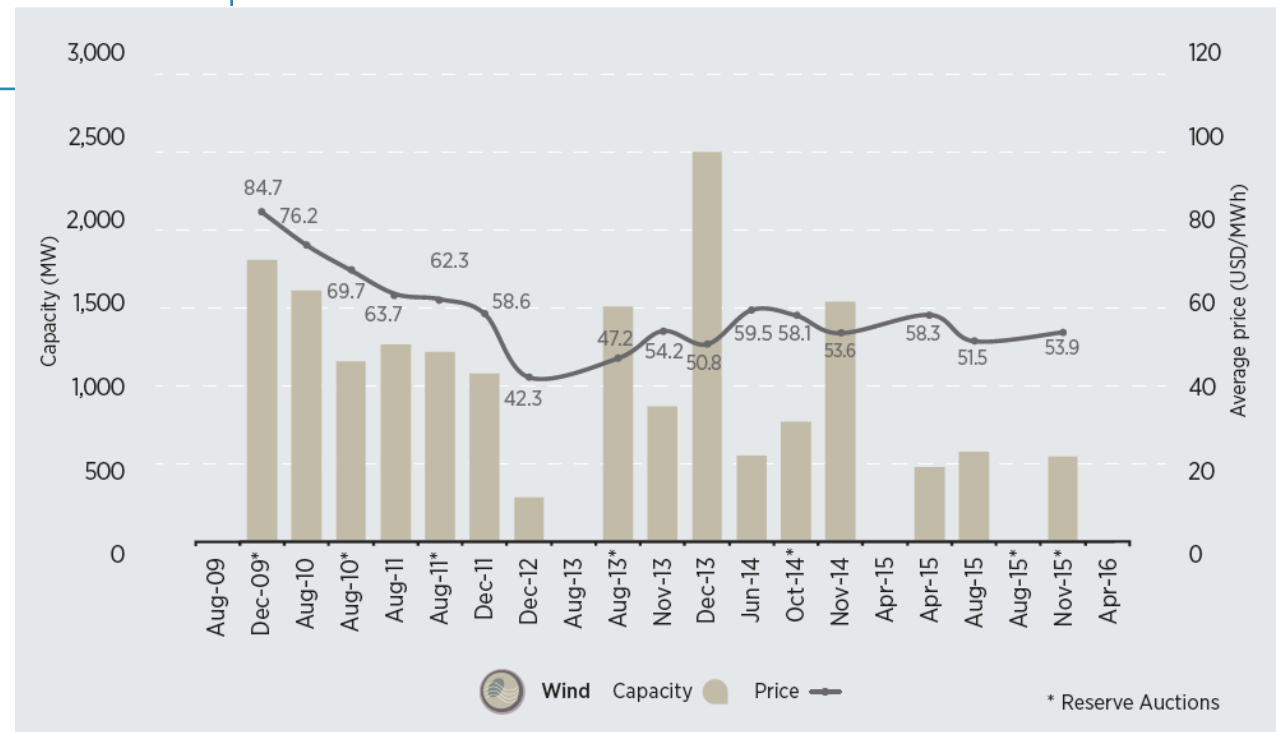


Source: based on Strategy &, 2016.

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

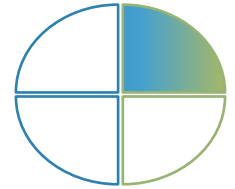
- Demanding to ensure project delivery as per the bid
- Limits participation to traditional and large players

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.



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Thank you!