

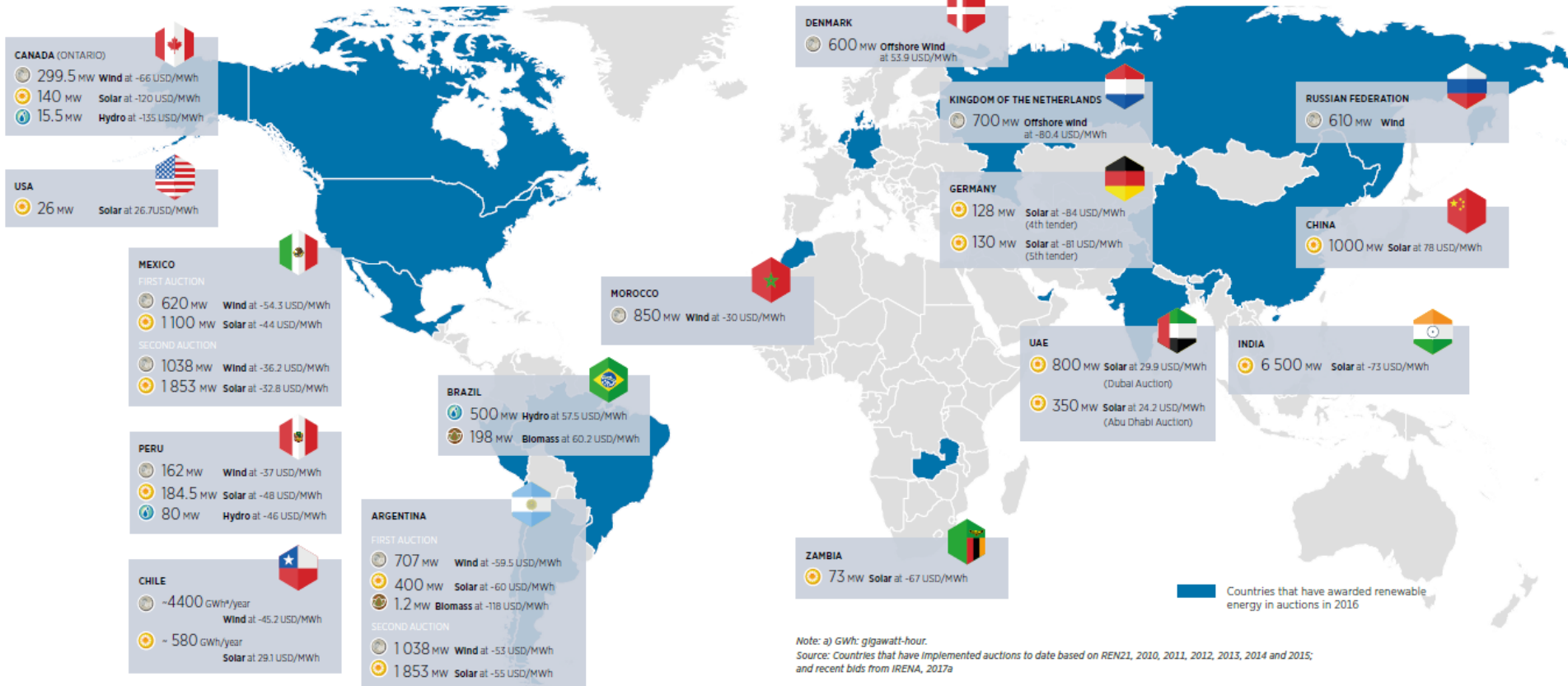
# Renewable Energy Auctions

## Analysing 2016

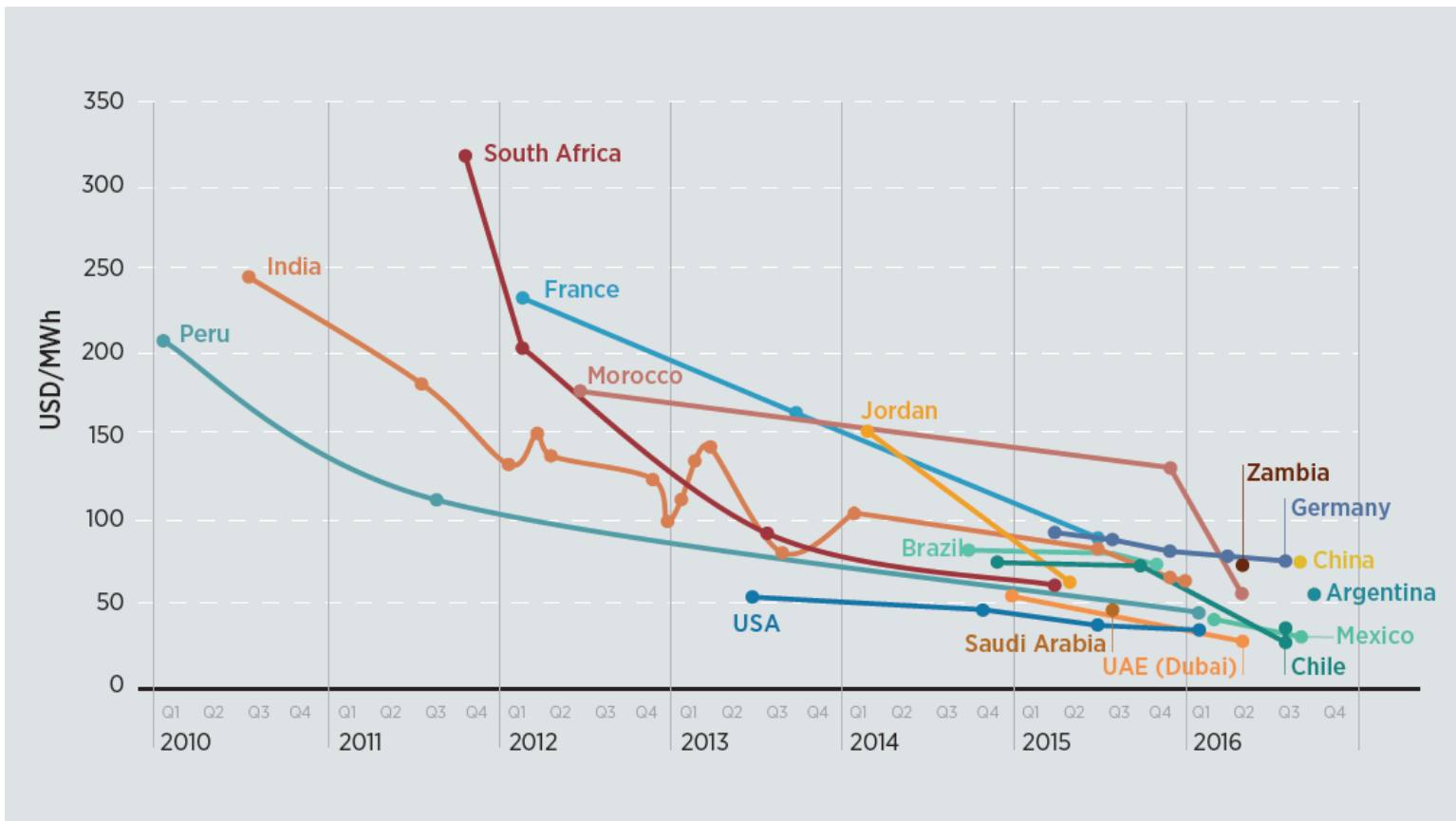
IRENA – Energy Community Workshop on Renewable Energy Auctions  
8 March 2017

## Renewable Energy Auctions

### Recent highlights



## Price trends: solar PV auctions

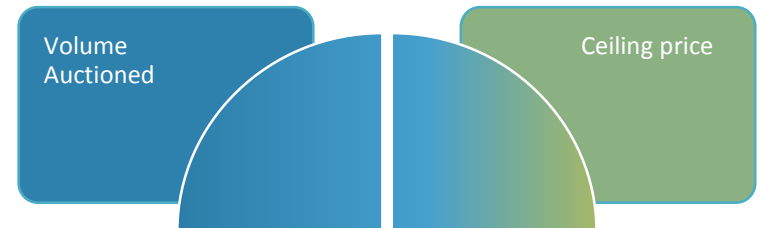


## Price trends: solar PV auctions

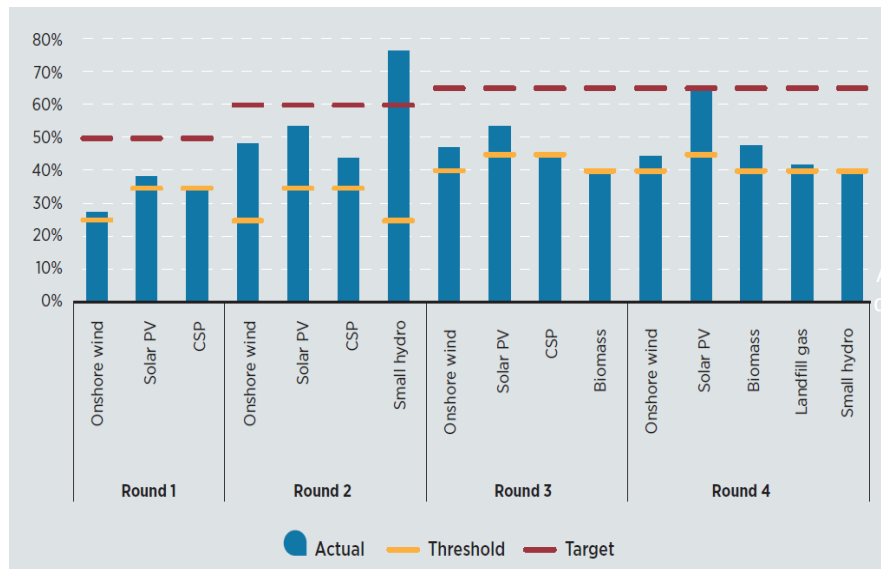
### Downward trends in South Africa

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

### Auction Design



### Local content requirements and achievements in South Africa



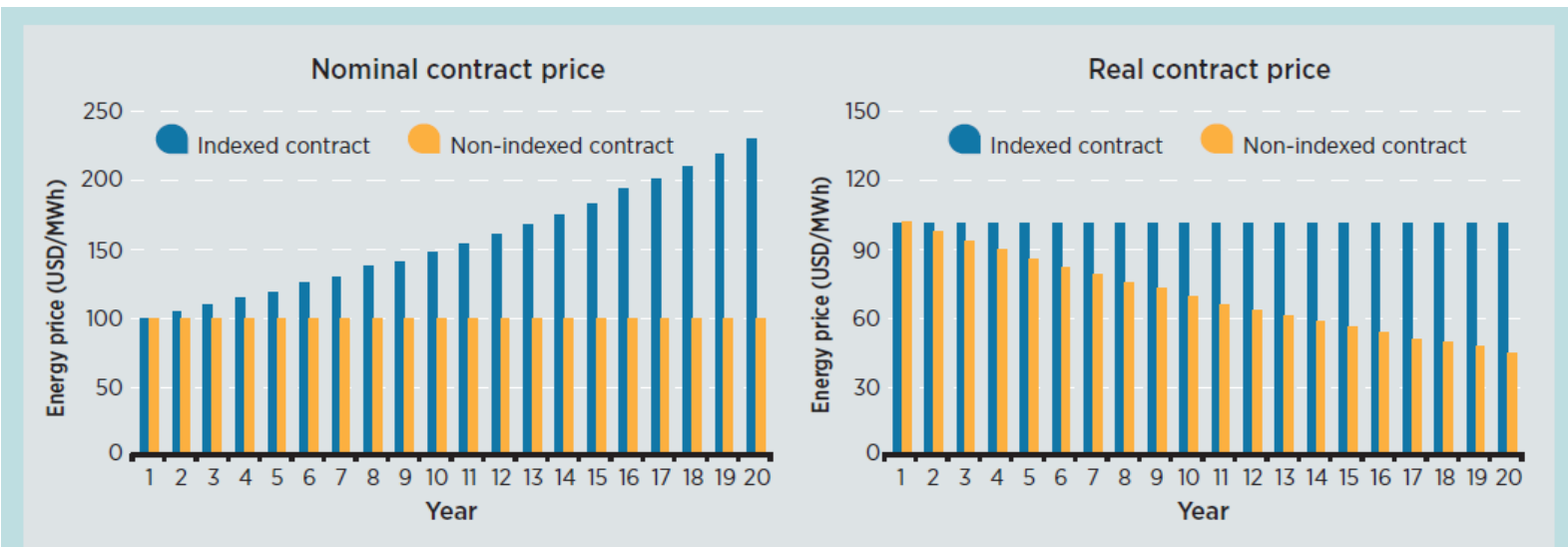
Source: Submitter, Montmasson-Clair, and Das Nair (2015).

## Price trends: solar PV auctions

### *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

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



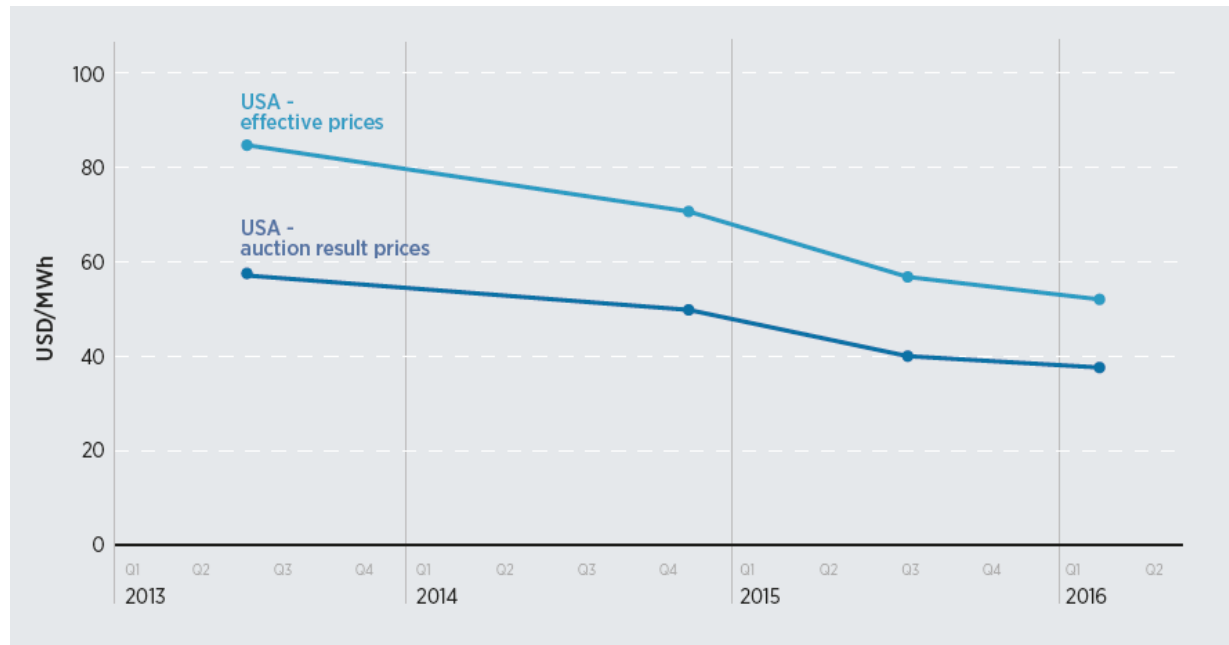
*Note: the figure aims to show the remuneration of indexed/non-indexed contracts under nominal and real terms. A contract price of USD 100/MWh and 4% inflation were used in this example, for illustrative purposes.*

## Price trends: solar PV auctions

### 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*



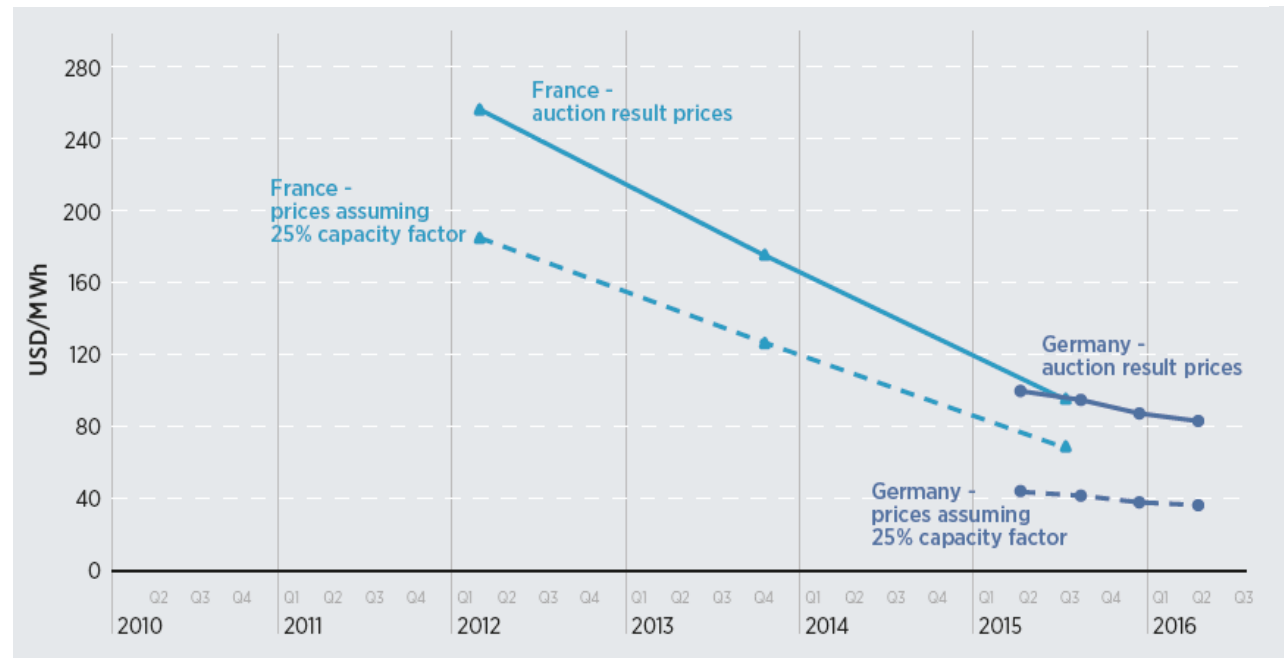
Source: based on data from Shahan, 2016.

## Price trends: solar PV auctions

### Higher prices in Germany

- ◆ Capacity factor average 11%
- ◆ Costs of installing and operating solar plants (land, labour, etc.)

**Solar prices in France and Germany: actual results vs. adjusted result assuming a benchmark capacity factor of 25%, February 2010-August 2016**



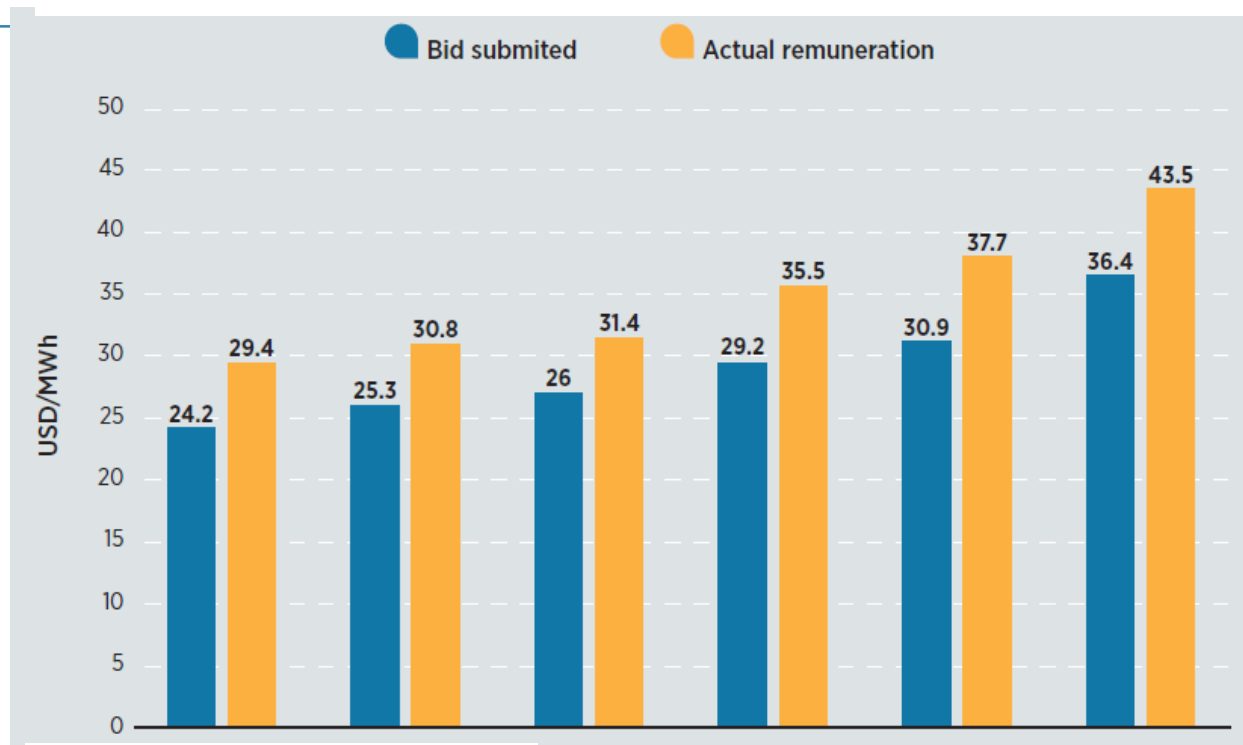
Source: based on data from BNEF, 2016.

## Price trends: solar PV auctions

### Remuneration profile in Abu Dhabi in the United Arab Emirates

- ◆ 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.

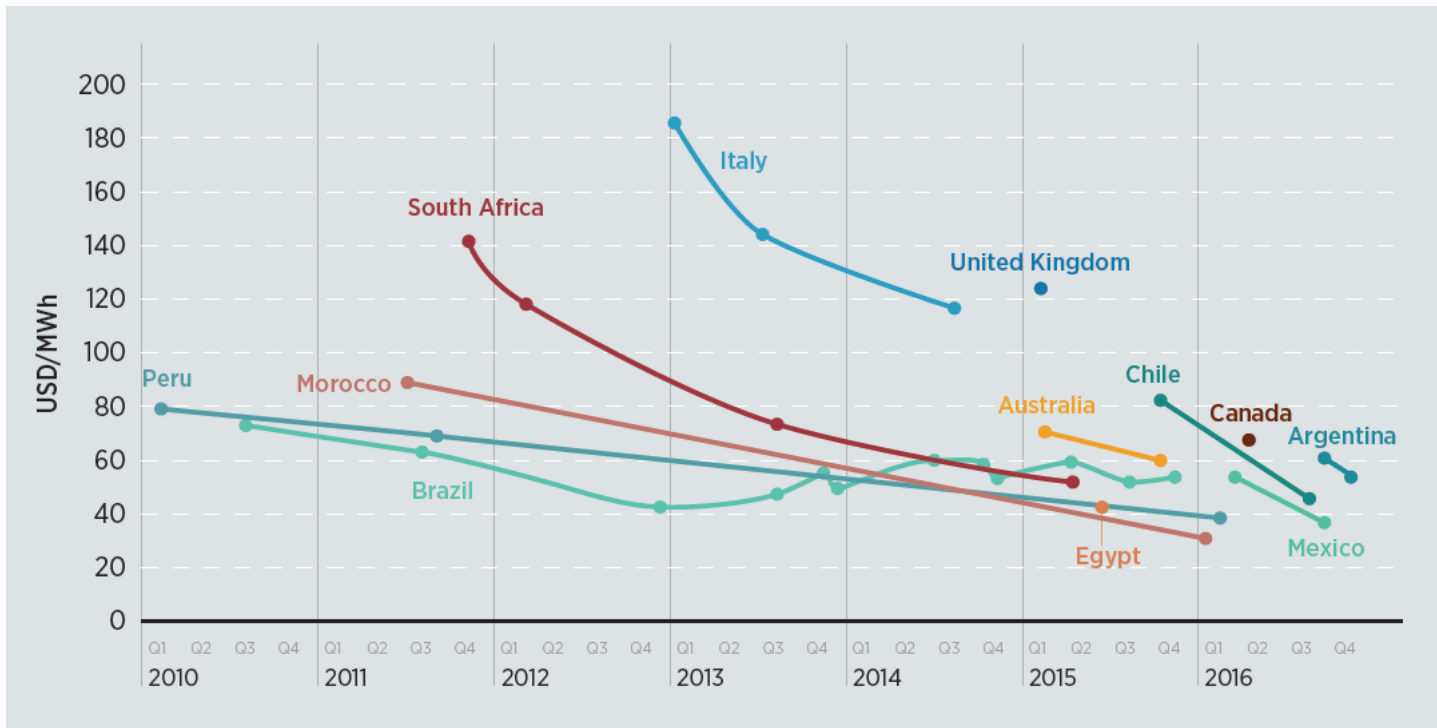
#### Abu Dhabi's solar auction: bid submitted vs. actual remuneration



Source: based on data from BNEF, 2016.



## Price trends: onshore wind auctions

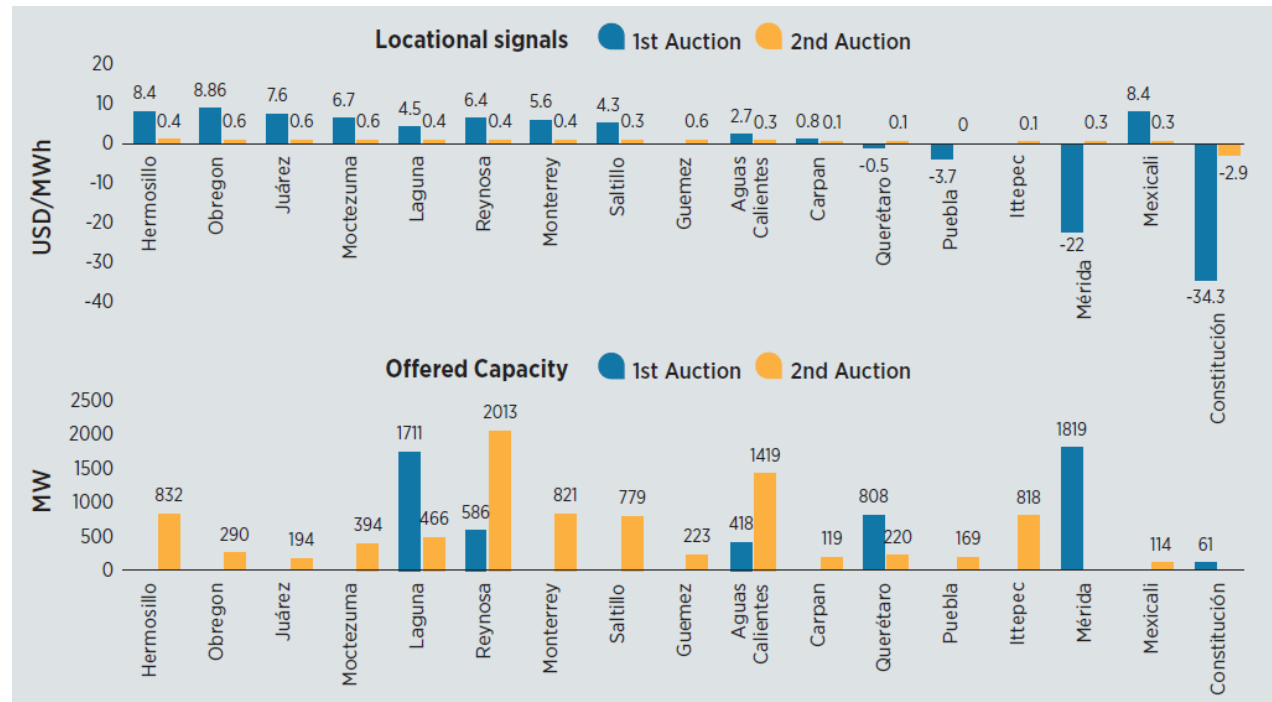


## Price trends: onshore wind auctions

### 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**

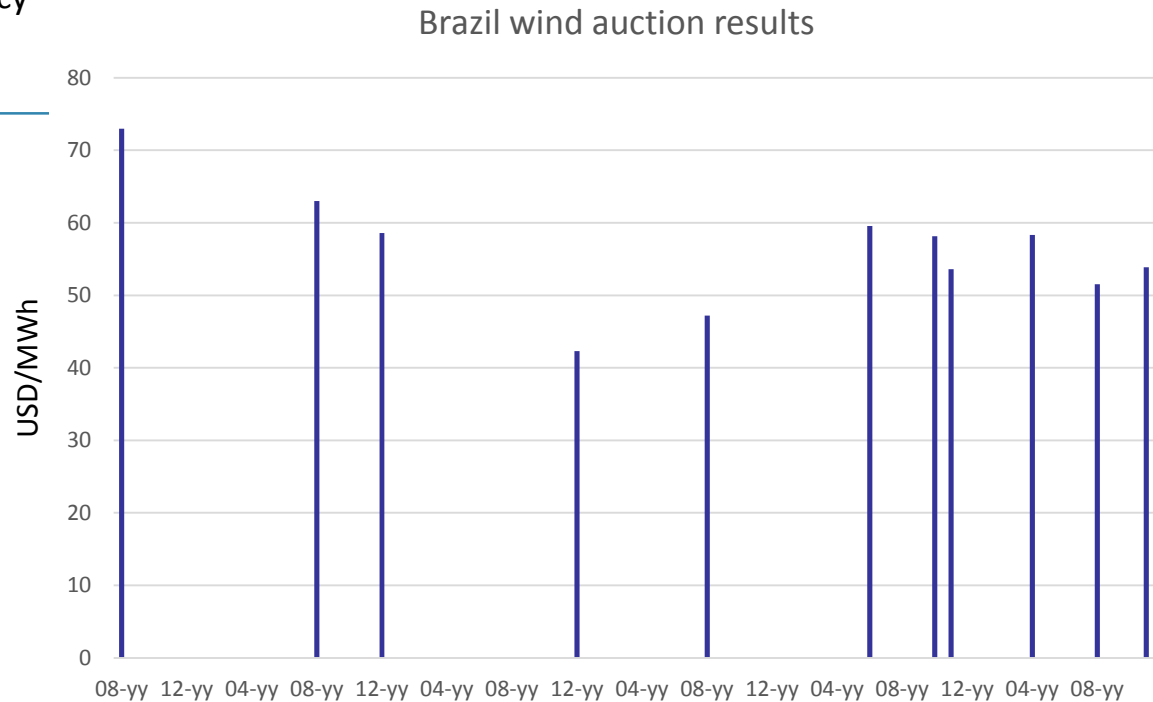


Source: based on Strategy &, 2016.

## Price trends: onshore wind auctions

### *Fluctuating prices in Brazil*

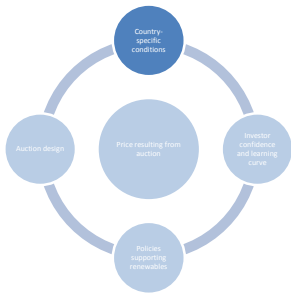
- ◆ Project lead times
- ◆ Intensified competition
- ◆ Availability of concessional financing
- ◆ Depreciation of the local currency
- ◆ Auction design



## Factors that impact the price



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### Country-specific conditions:

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



## Factors that impact the price



### Investor confidence and learning curve:

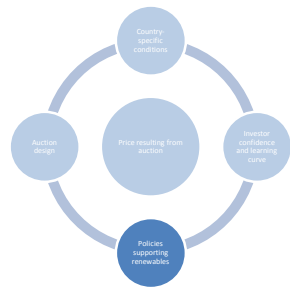
- ◆ Credibility of off-taker
- ◆ Periodicity of auctions (as part of a long-term plan)
- ◆ Confidence from past auctions
- ◆ Lessons learnt from past auctions (auctioneer and bidders)
- ◆ Reuse of documents/studies from past rounds

### Systematic auctions and the learning curve impact

Country	Renewable energy technology	First iteration	Second iteration	Learning curve impact
South Africa	Various	2011: 53% bids qualified	2012: 64.5% bids qualified	+11% increase in bid qualification rate
India	Solar PV	2010: 12.16 INR/kWh	2011: 8.77 INR/kWh	28% decrease in contracted price
California (USA)	Various	2011: 92 bids received	2012: 142 bids received	+54% of bids received

Source: IRENA and CEM, 2015.

## Factors that impact the price

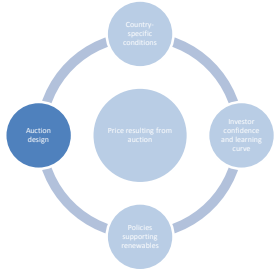


### Policies and measures supporting renewable energy development

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

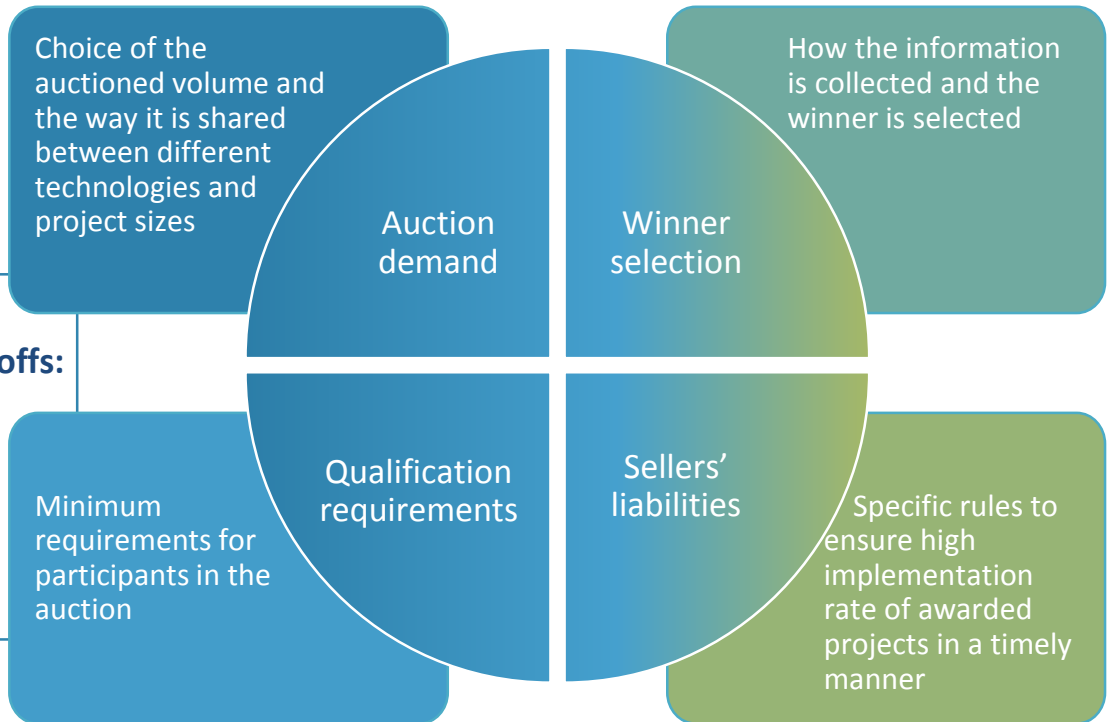
NATIONAL POLICY	REGULATORY INSTRUMENTS	FISCAL INCENTIVES	GRID ACCESS	ACCESS TO FINANCE <sup>a</sup>	SOCIO-ECONOMIC BENEFITS <sup>b</sup>
<ul style="list-style-type: none"> <li>◆ Renewable energy target</li> <li>◆ Renewable energy law/strategy</li> <li>◆ Technology-specific law/programme</li> </ul>	<ul style="list-style-type: none"> <li>◆ Feed-in tariff</li> <li>◆ Feed-in premium</li> <li>◆ Auction</li> <li>◆ Quota</li> <li>◆ Certificate system</li> <li>◆ Net metering</li> <li>◆ Mandate (e.g., blending mandate)</li> <li>◆ Registry</li> </ul>	<ul style="list-style-type: none"> <li>◆ VAT/ fuel tax/ income tax exemption</li> <li>◆ Import/export fiscal benefit</li> <li>◆ National exemption of local taxes</li> <li>◆ Carbon tax</li> <li>◆ Accelerated depreciation</li> <li>◆ Other fiscal benefits</li> </ul>	<ul style="list-style-type: none"> <li>◆ Transmission discount/exemption</li> <li>◆ Priority/dedicated transmission</li> <li>◆ Grid access</li> <li>◆ Preferential dispatch</li> <li>◆ Other grid benefits</li> </ul>	<ul style="list-style-type: none"> <li>◆ Currency hedging</li> <li>◆ Dedicated fund</li> <li>◆ Eligible fund</li> <li>◆ Guarantees</li> <li>◆ Pre-investment support</li> <li>◆ Direct funding</li> </ul>	<ul style="list-style-type: none"> <li>◆ Renewable energy in rural access/cook stove programmes</li> <li>◆ Local content requirements</li> <li>◆ Special environmental regulations</li> <li>◆ Food and water nexus policy</li> <li>◆ Social requirements</li> </ul>

## 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



IRENA and CEM, 2015



## The way forward in planning and designing auctions

- ◆ Understanding the reasons behind the recent low prices is important to make informed policy choices
  - The low prices attained can be due to additional financial support, indexed contracts, or additional remuneration during periods of peak demand, etc.
- ◆ Concerns with auctions underestimating the true costs of renewable energy (e.g. balancing costs of renewables) or causing overly aggressive bidding
- ◆ Risks of underbuilding and delays can be reduced with solid contracts, enforceable penalties, and legal and regulatory stability. However, stringent compliance rules may deter the participation of small and/or 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, structure of the energy sector, maturity of the power market and level of renewable energy deployment)
- ◆ The complex and dynamic environment of renewable energy auctions motivates constant innovation in the mechanisms' design. The assessment of previous implementations and the most recent experiences is crucial



# IRENA

International Renewable Energy Agency

**Thank you!**