



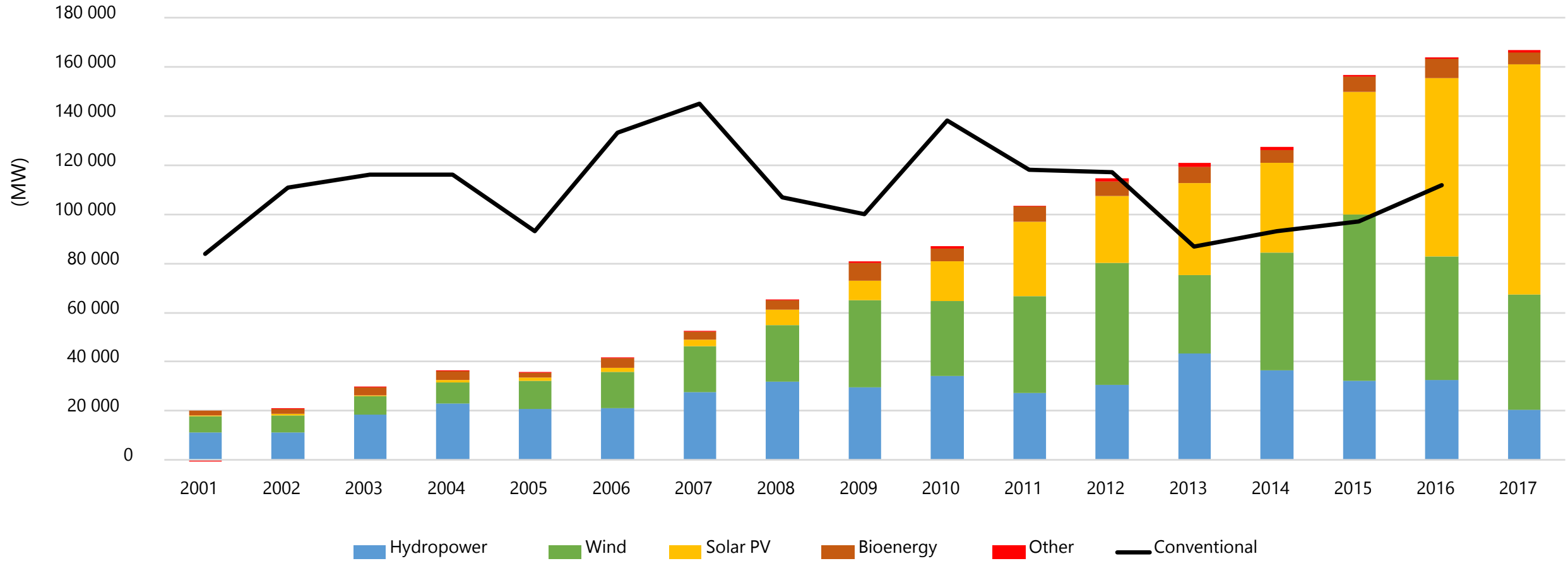
How to design an auction? Design elements and its influence on the market price. Best examples and lessons learnt

February 21, 2019, Kyiv, Ukraine

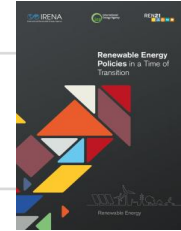
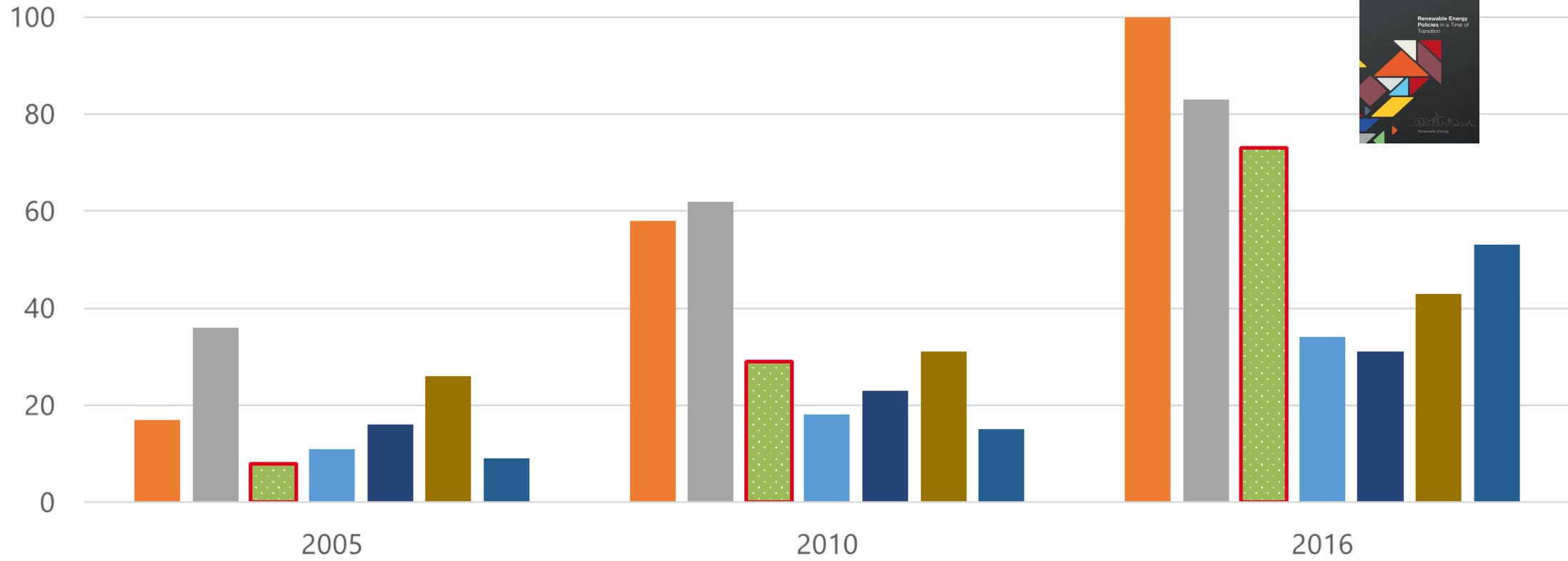
Scene setting

The transition in the power sector

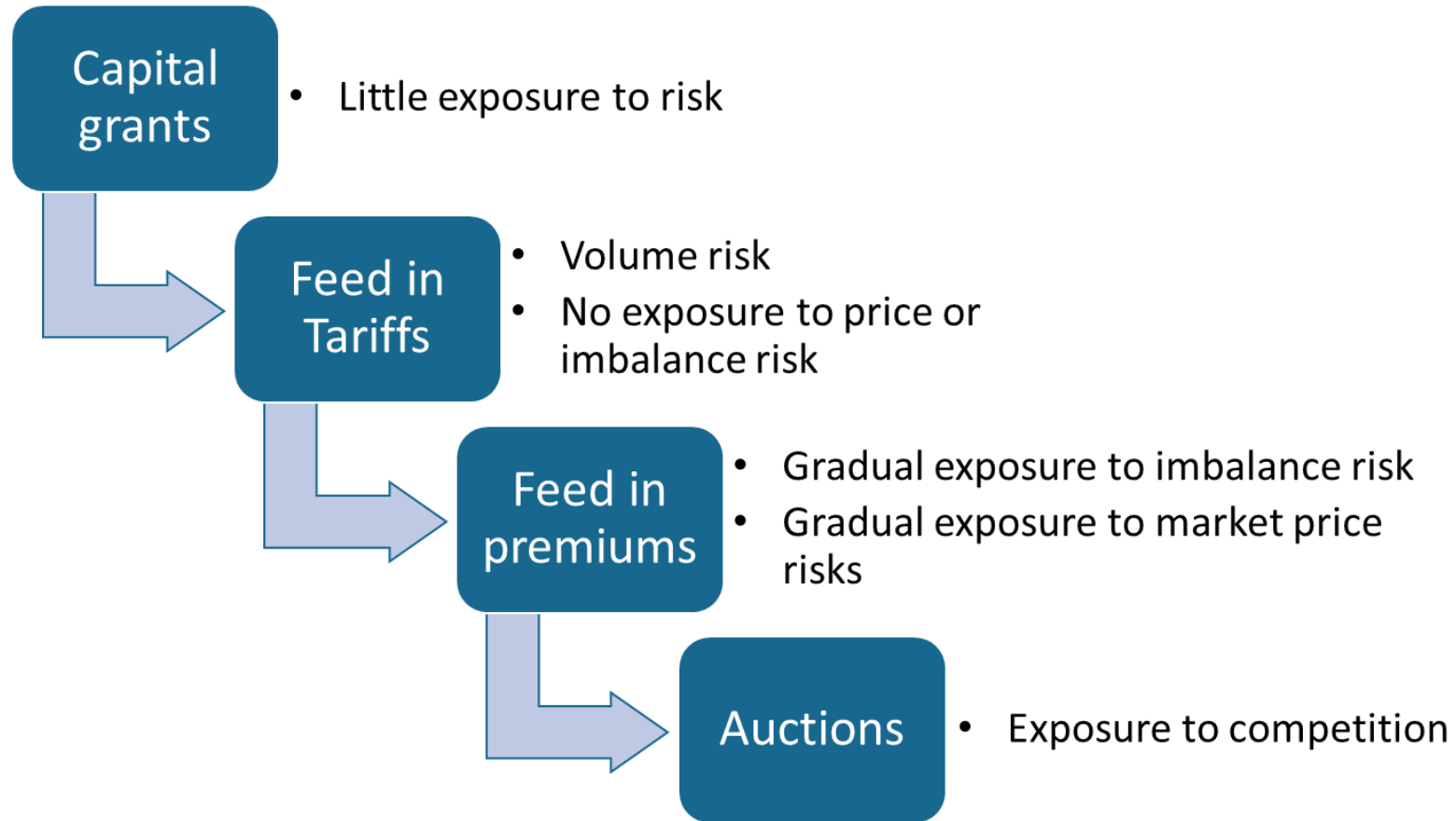
Global capacity addition, 2001-2017



Trends in renewable energy policies



- Reduction in sales, energy, CO2, VAT or other taxes
 Feed-in tariff/ premium
 Auctions
- Electric utility quota obligation / RPS
 Tradable REC
 Investment or production tax credits
- Net metering

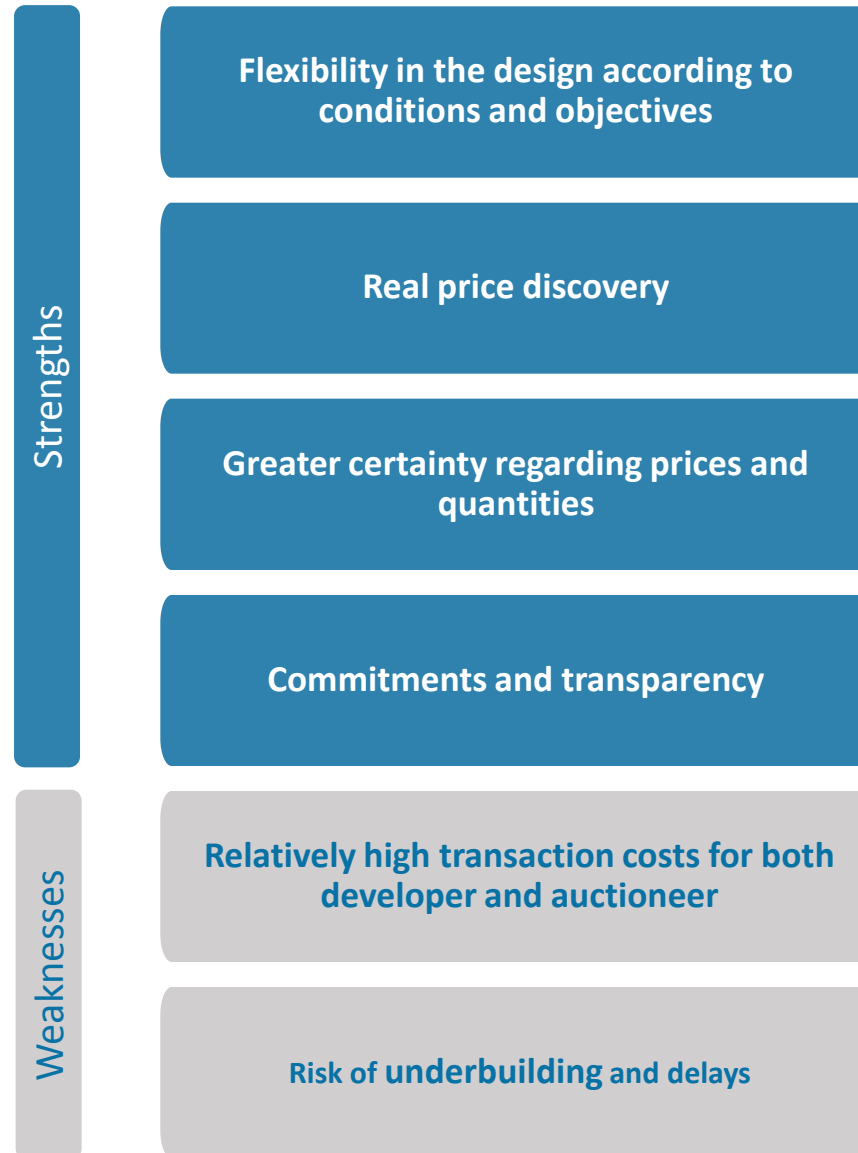


A growing number of countries (both in the developed and in the developing world) are implementing auctions, although usually combined with other instruments.

Factors impacting price in auctions

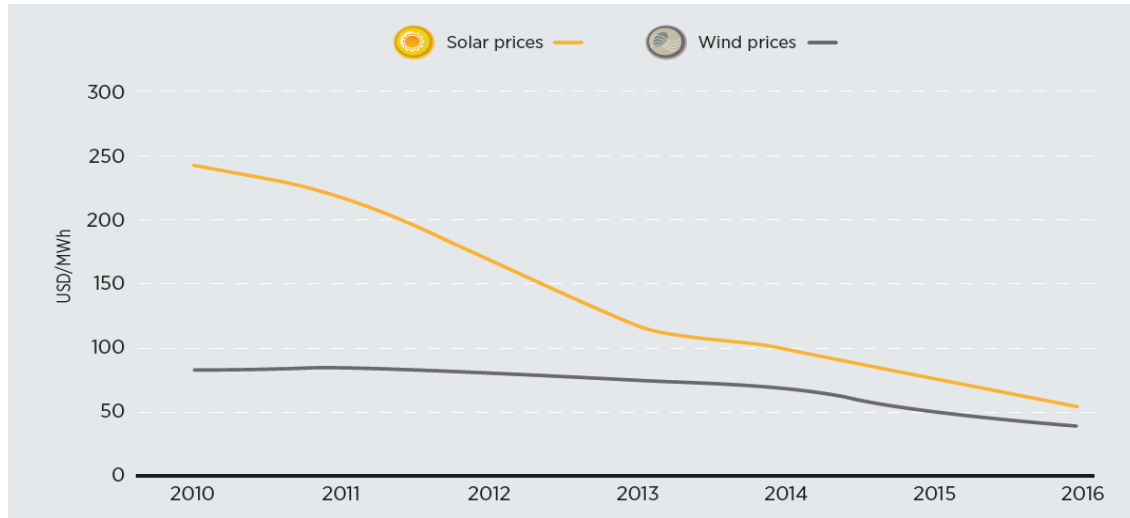
Auction design and trade-offs

Auctions Strengths and Weaknesses



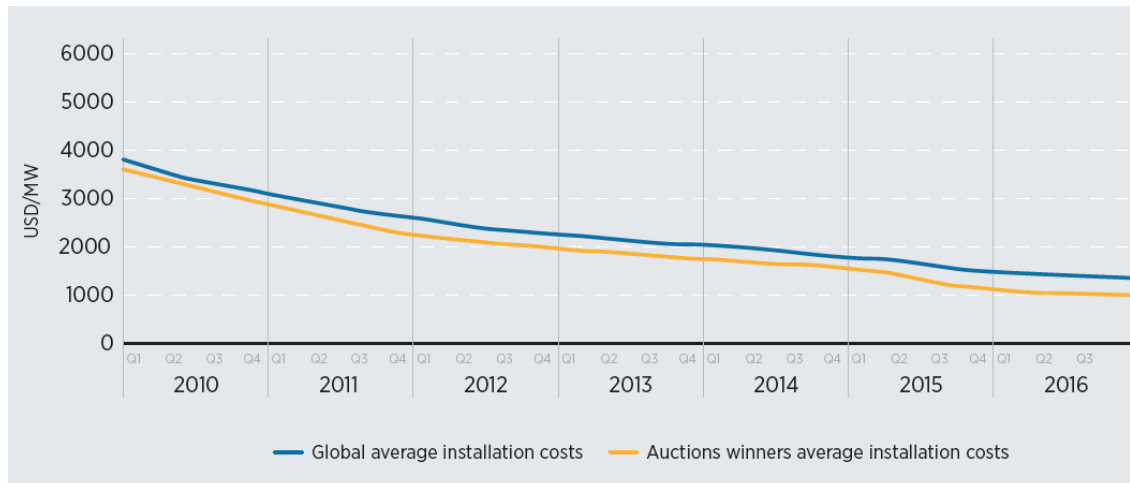
Auctions potential for real price discovery

Average prices resulting from auctions, 2010-2016



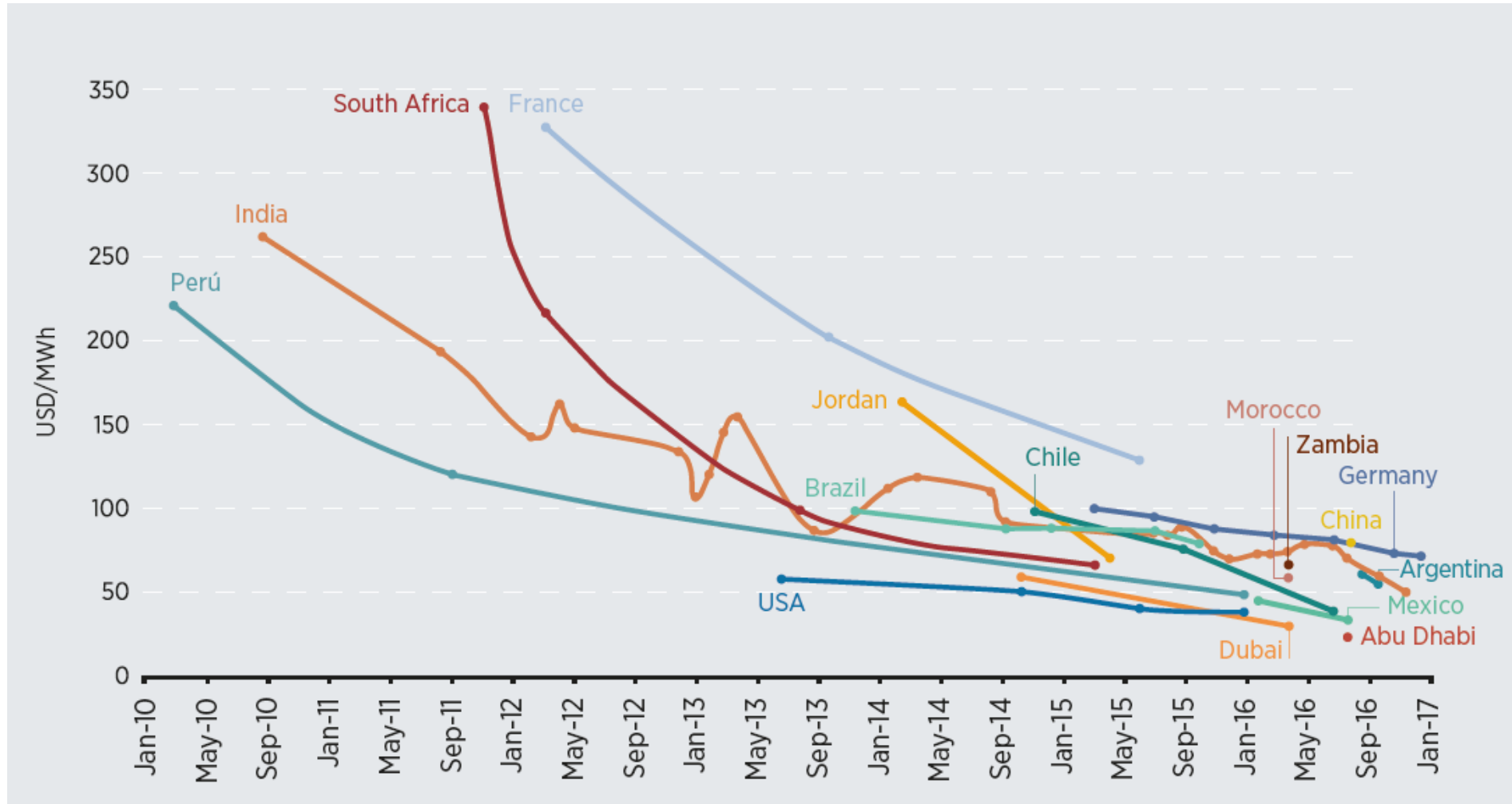
- Solar energy was contracted at a global average price of almost USD 250/MWh in 2010, compared with the average price of USD 50/MWh in 2016.
- Wind average prices have also fallen from USD 80/MWh in 2010 down to USD 40/MWh in 2016.

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

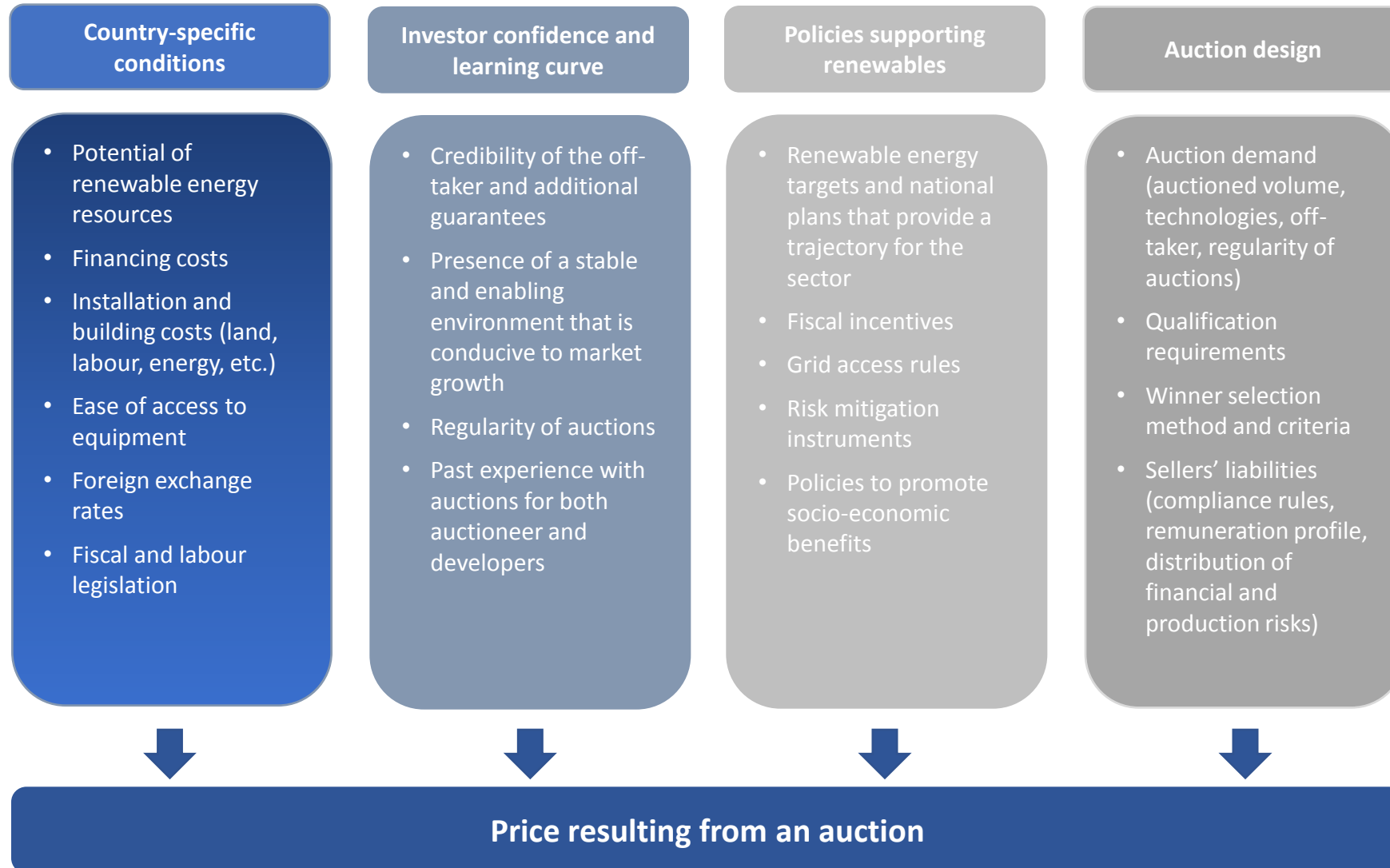


- The average installation costs of projects awarded from auctions are consistently lower than global average installation costs.

Price trends: solar PV auctions



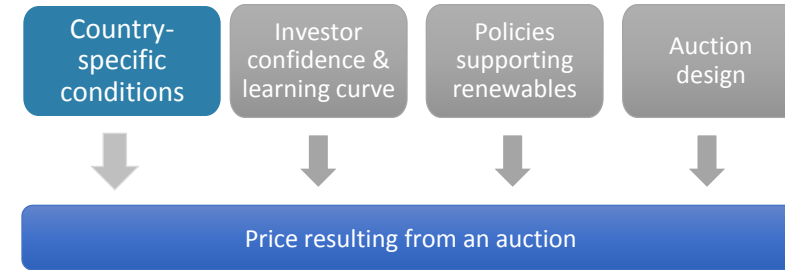
Price-impacting factors



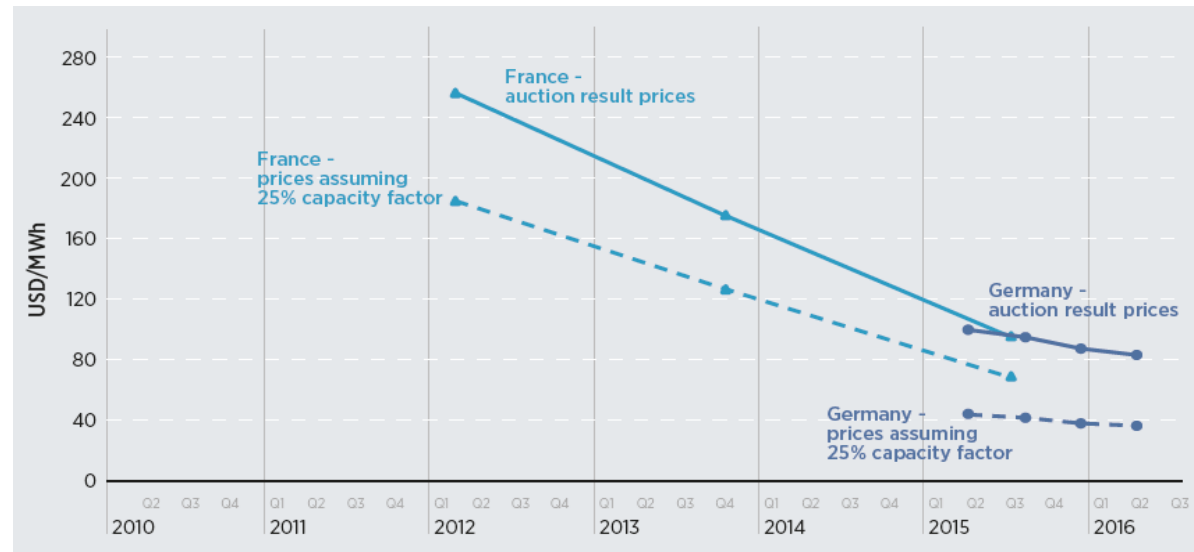
Country-specific conditions

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

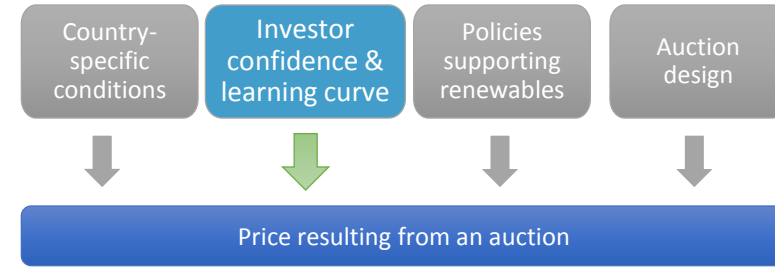


Source: based on data from BNEF, 2016.

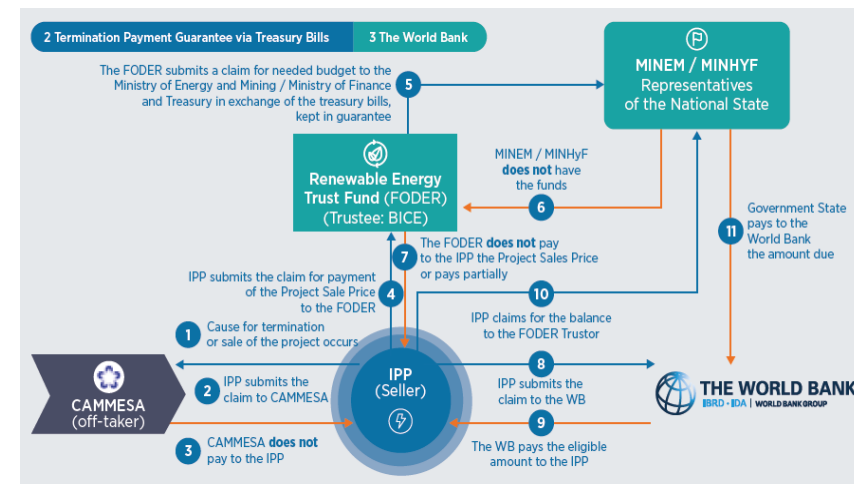
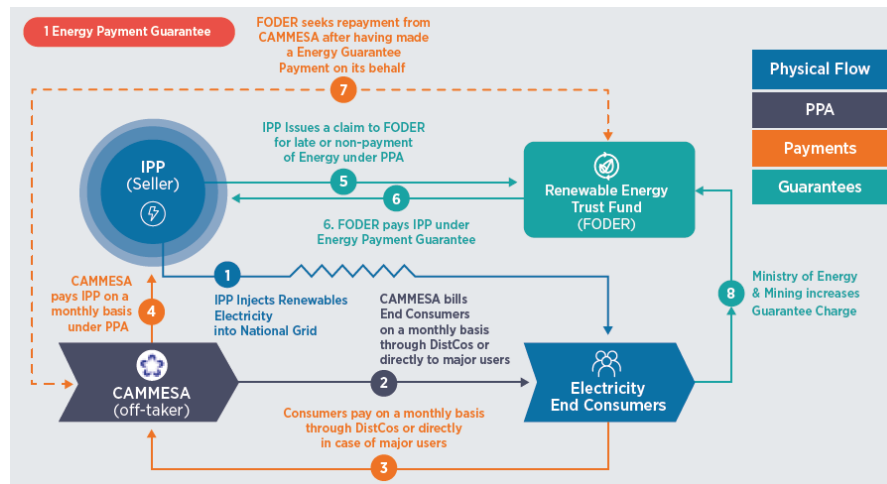
Investor confidence and learning curve:

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

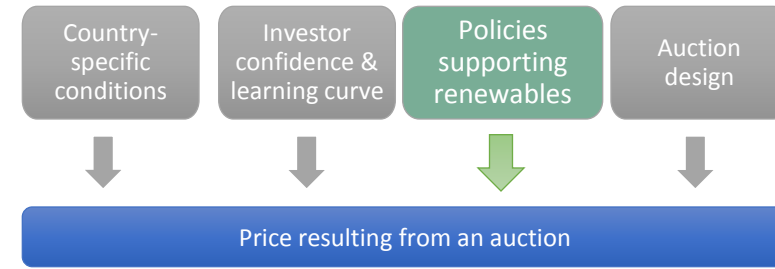


Source: MINEM, 2016.

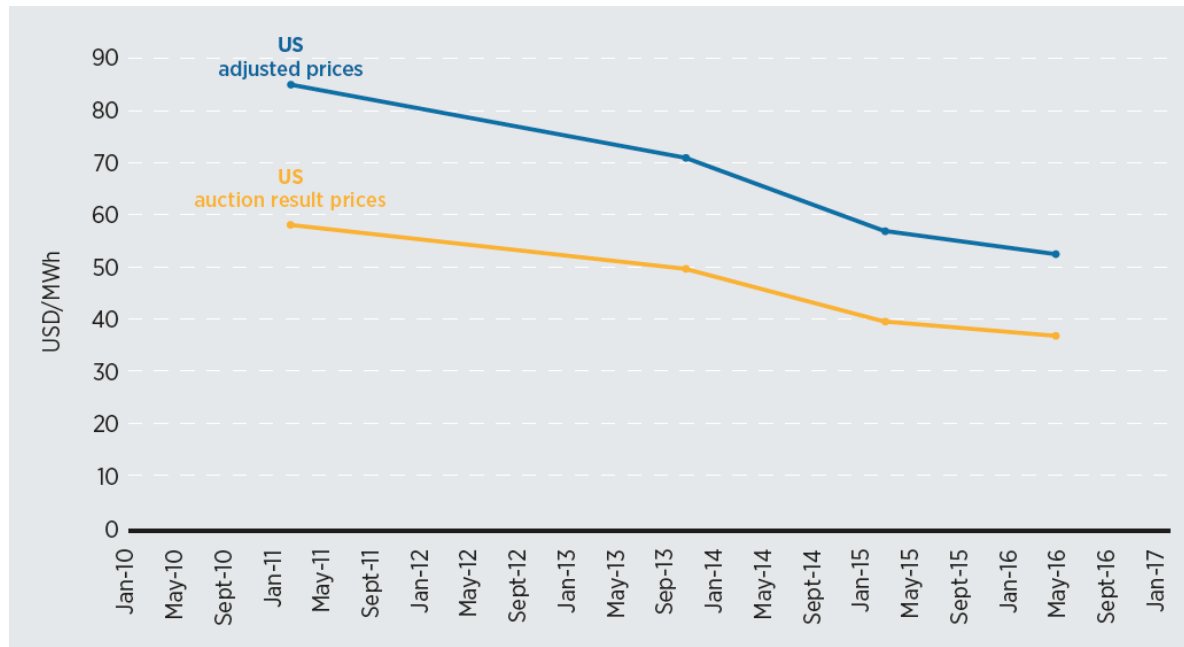
Policies and measures for RE development

Policies and measures for RE development

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

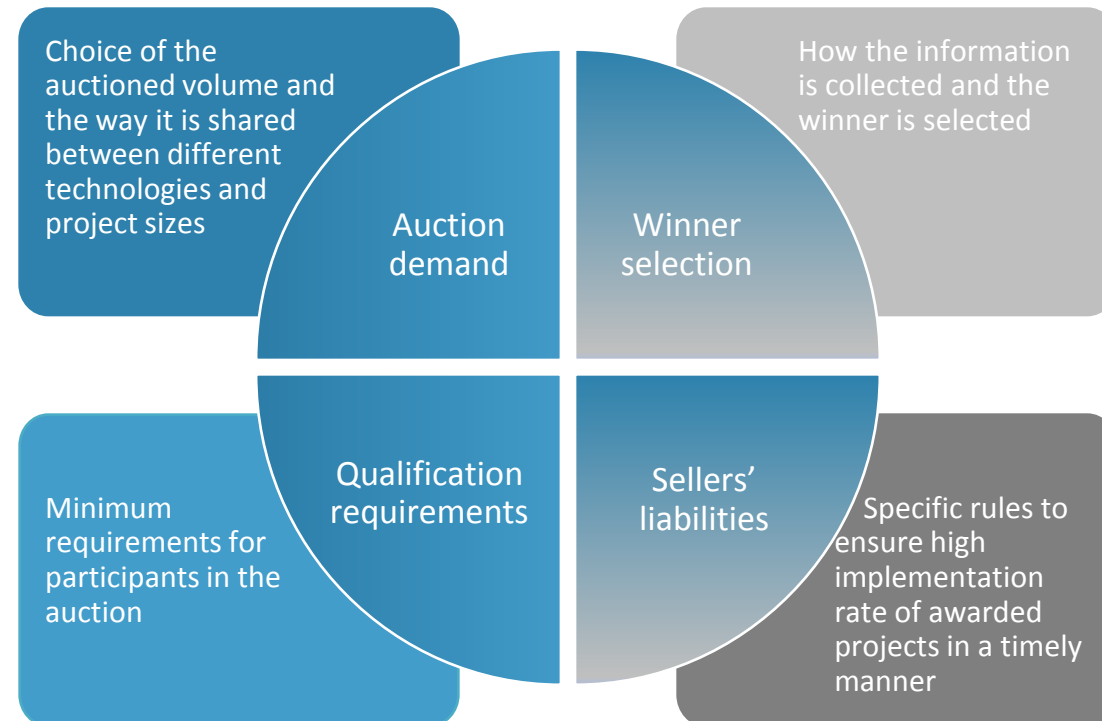
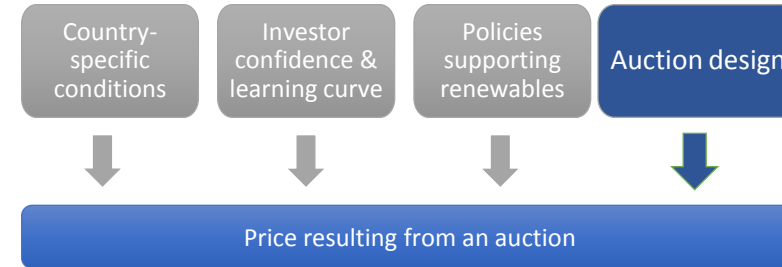


US auction result and adjusted price



The design of the auction considering trade-offs:

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



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

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 auctioneer or the consumers

Trade-offs in Qualification Requirements

Qualification requirements

Minimum requirements for participants in the auction

Permitting and documentation

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

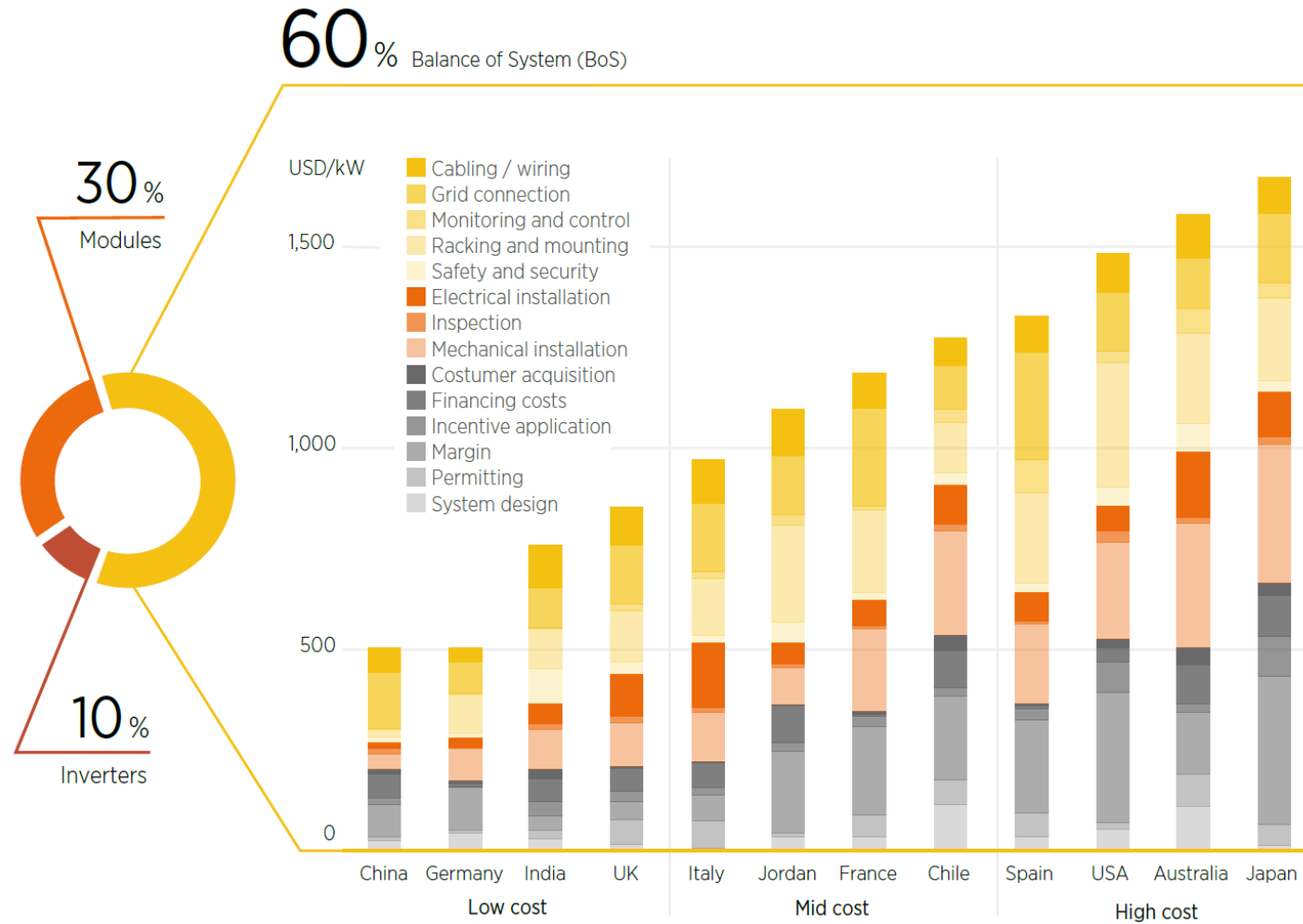
Extensive track record and financial capability

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

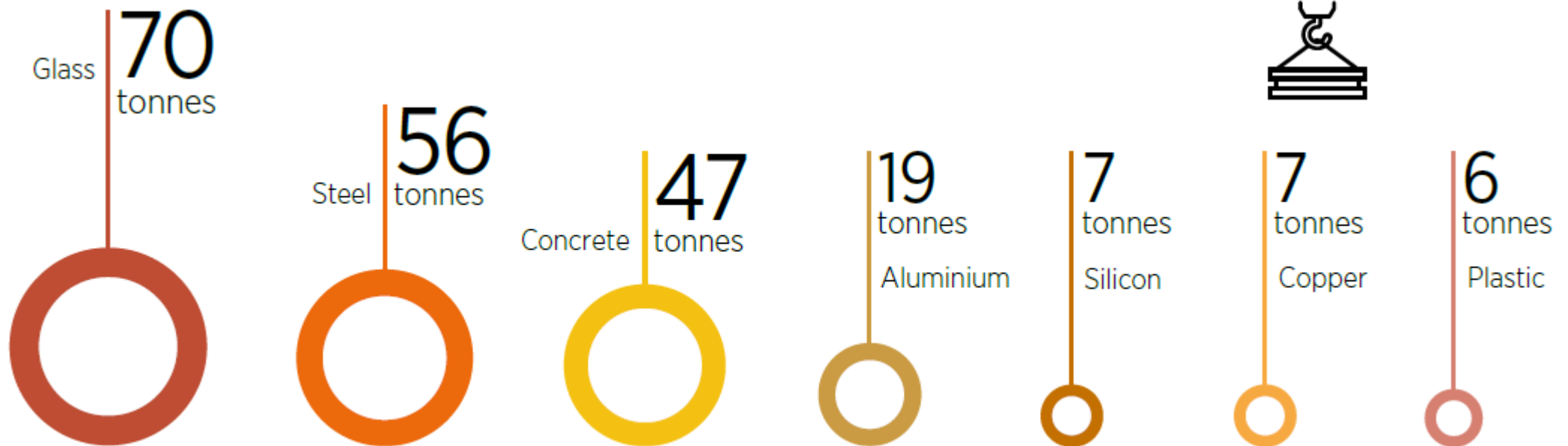
Ensuring global socio-economic development goals

- Ambitious to maximize domestic benefits
- Higher prices on the short term

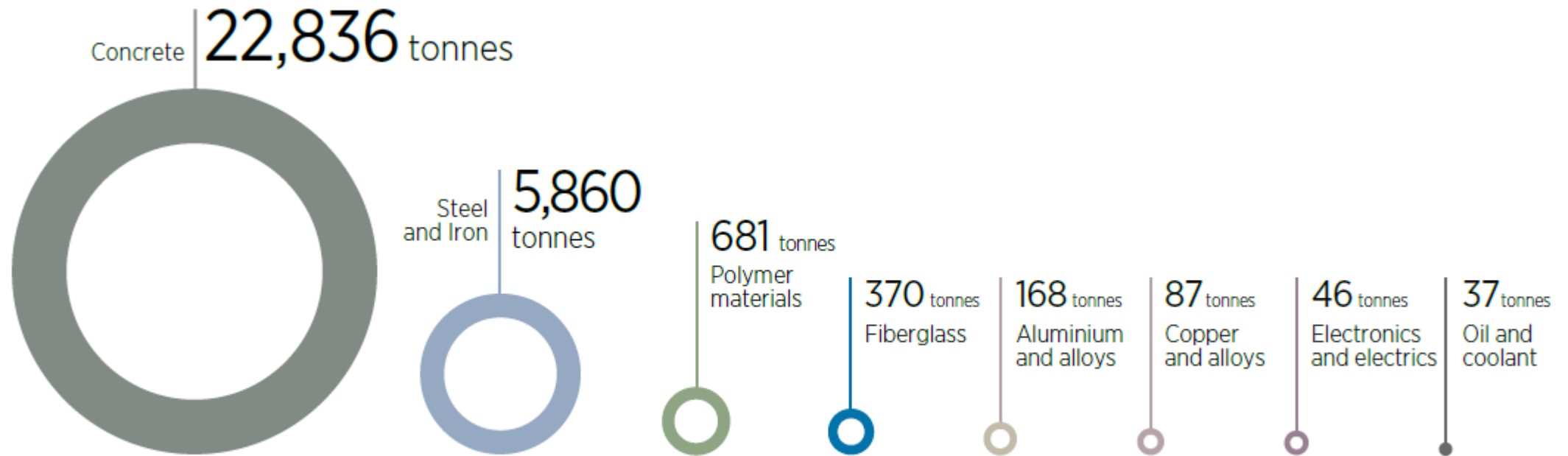
Distribution of costs of a large-scale solar PV in 2015



Materials needed to develop a 1 MW Silicon-based solar PV plant (tonnes)



Materials needed to develop a 50 MW wind farm (tonnes)



Source: Vestas, 2015

How the information is collected and the criteria for the winner selection

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

Trade-offs in Sellers' Liabilities

Sellers' liabilities

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

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 conditions, 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.

Auctions and VRE integration

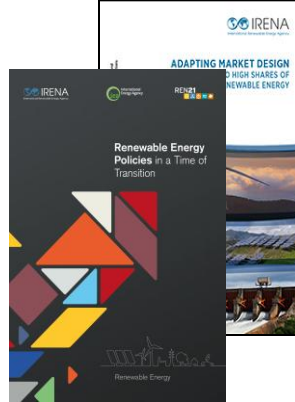
VRE properties and relative market measures – some examples

VRE properties

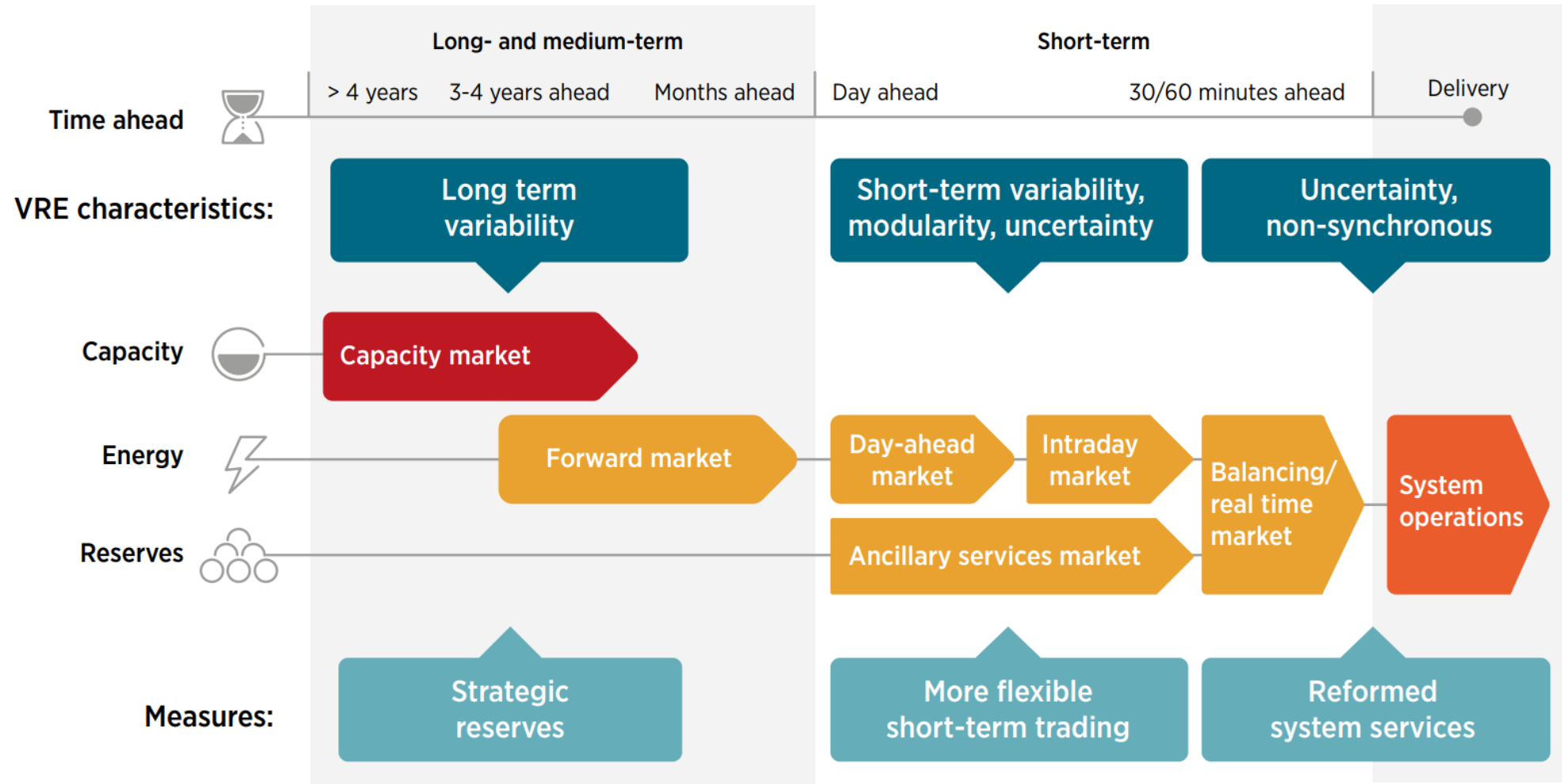
1. Location constrained
2. Non-synchronous generation
3. Distributed/Modular
4. Variability
5. Uncertainty
6. Low short-term costs

Market measures

1. Revised system services procurement
2. Strategic reserves
3. More flexible short-term market



VRE properties and market measures (examples)

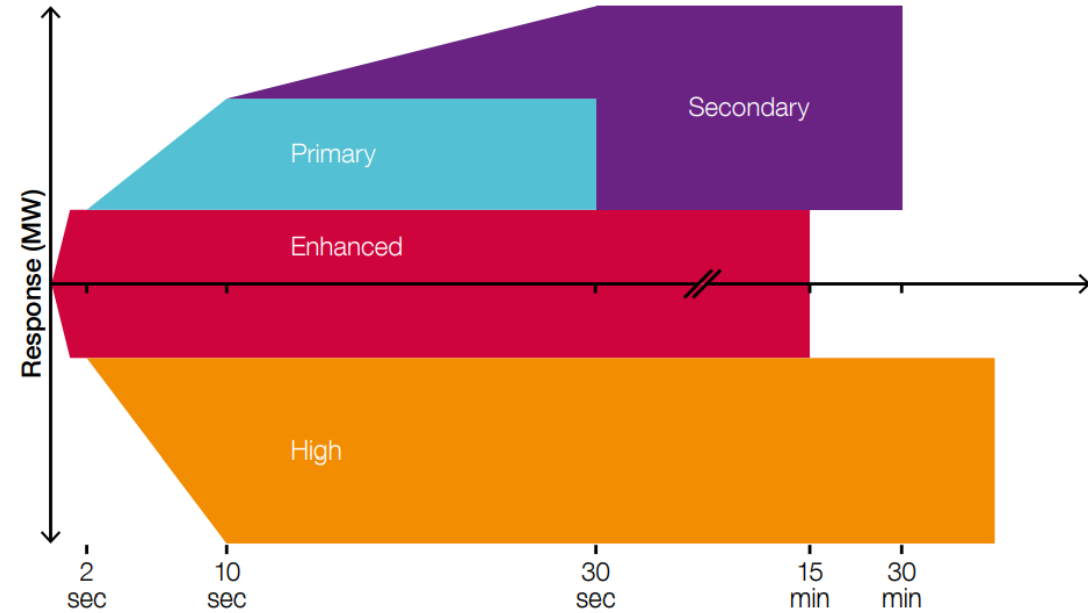


Enhanced Frequency Response (UK)

Enhanced Frequency Response (EFR) procurement

- With the rise of VRE and the gradual decommissioning of dispatchable power plants, power systems are becoming more susceptible to sudden variations in power generation or consumption.
- EFR which is capable of responding to grid fluctuations in less than one second, has been adopted in UK.
- Technology agnostic auctions have been held and 8 storage projects (201 MW) were selected for the provision of this service

Design of UK's frequency response



Value-based auctions (Mexico)

Mexico's sophisticated energy auction design

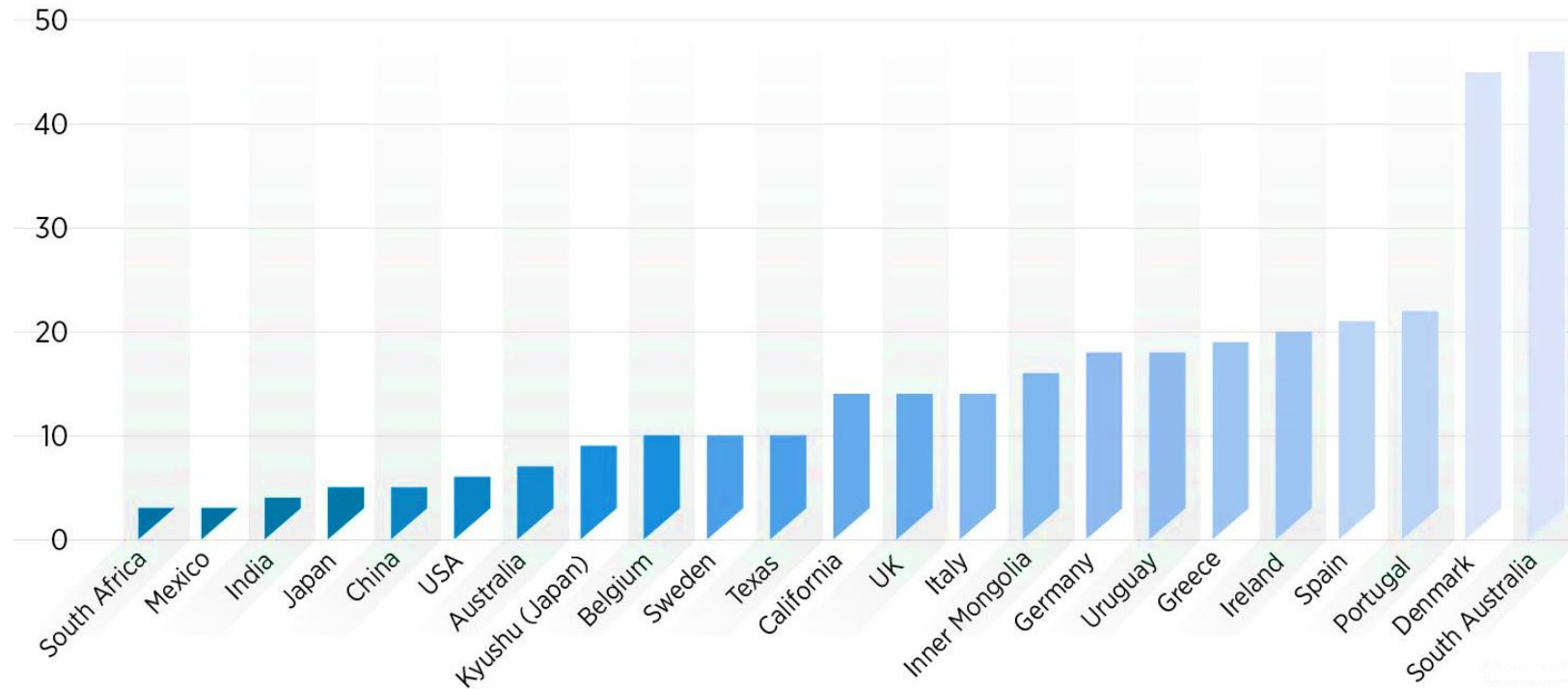
- New auction scheme, adopted with the market liberalization
- Auctions are technology-neutral for clean energy options.
- Energy auctions design incorporates **time** and **locational** signals, to facilitate the deployment of higher value VRE plants
- Demand is set on load forecast (similarly to Brazil) by utilities and privates
- Average winning bids passed from 47.8 USD/MWh to 20.6 USD/MWh in 3 years, for a total of 7.3 GW added capacity.

Geographical diffusion



The gradual challenge

Share of VRE generation, 2016



Source: IRENA/IEA/REN 21 (2018), Renewable energy policies in a time of transition

Experience shows that challenges emerge gradually. A focus on the right set of issues will allow to continue progress, giving time to adopt comprehensive approaches

Key considerations in designing and implementing auctions

Key considerations in designing and implementing auctions

Increasing competition for cost-efficiency

- Increased participation of bidders
- Prevention of collusion and price manipulation

Limiting participation to bidders who can meet goals

- Project delivery
- Deployment goals

Ensuring global socio-economic development goals

- Qualification requirements
- Multi-criteria selection

Increasing competition for cost-efficiency

Increasing competition for cost-efficiency

- Diversity of technology
- Volume auctioned
- Level of participation of bidders
 - Reducing entry barriers
 - Reducing the perception of risk
- Prevention of collusion and price manipulation

Limiting participation to bidders who can meet goals

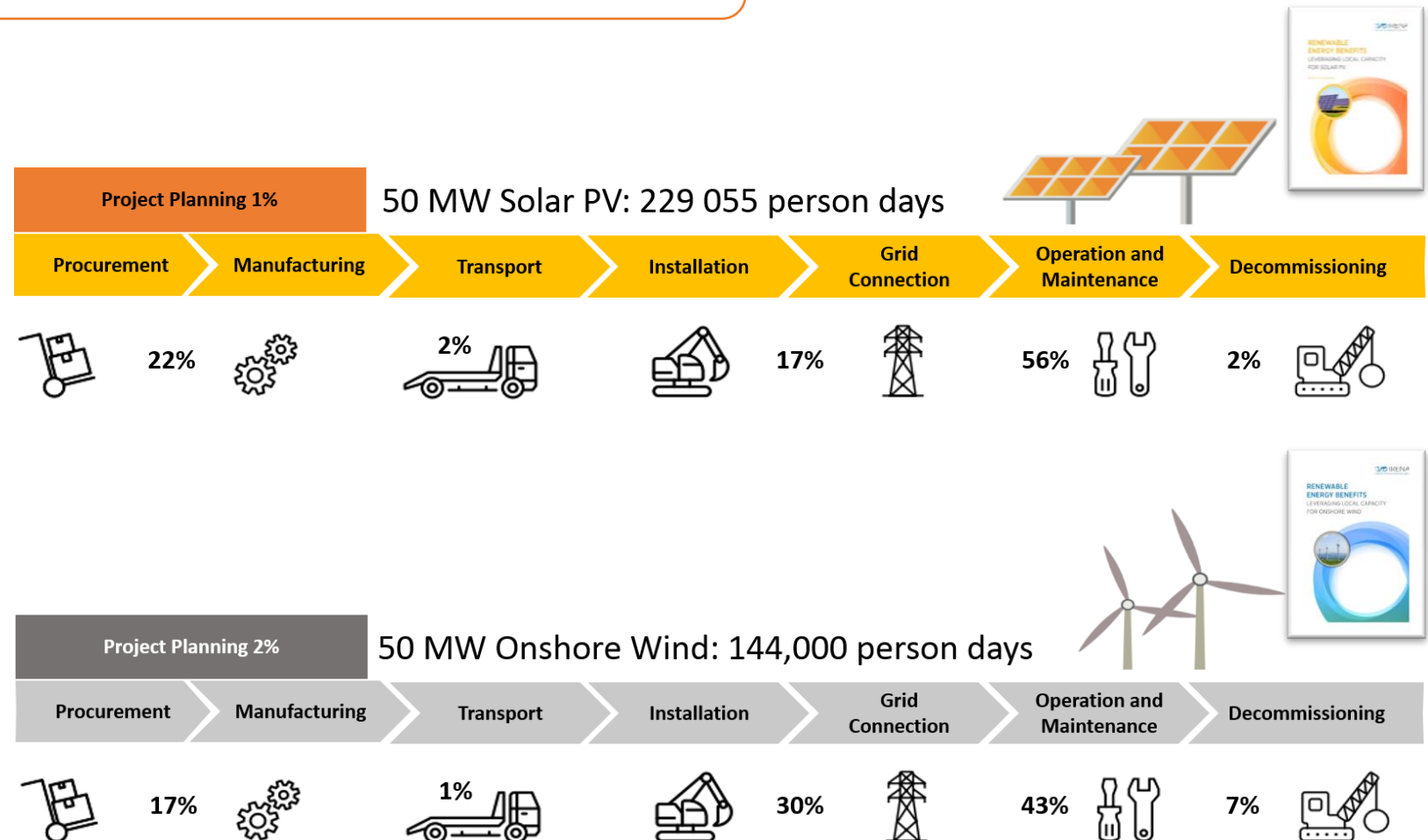
Limiting participation to bidders who can meet goals

- Reputation requirements
- Compliance rules
- Technological requirements
- Project size requirements
- Location constraints
- Grid access requirements

Ensuring development goals

Ensuring development goals

- Qualification requirements
- Multi criteria selection





Download IRENA reports on Auctions

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Thank you!