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Countries' experience on solar auctions: Key considerations and lessons learned

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Agenda

1. How do developing countries in early stage of RE deployment design a solar auction scheme? (**guiding question of this presentation!**)
2. Factors influencing auction prices
3. Success factors and barriers in auction design and implementation
4. Key messages

Solar PV auctions in Peru and Zambia

Peru

Share of hydro in the electricity mix:
47.6% (2016)

Aims to diversify away from hydro
due to likelihood of water stress
caused by climate change

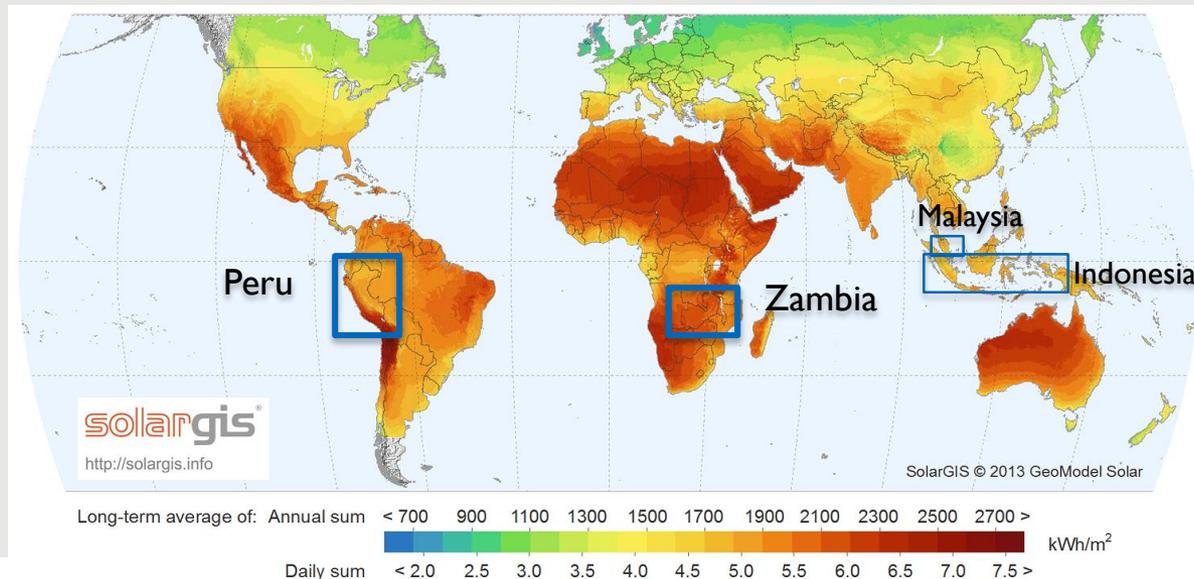
Has been implementing solar
auctions since 2009

Zambia

Share of hydro in the electricity mix:
95% (2016)

Droughts caused power shortage to
widen to half of peak demand, i.e.
approx. 1 GW in 2015

Has implemented one round of
auctions; 2nd round is ongoing





I. How do developing countries in early stage of RE deployment design a solar auction scheme?

Auction design depends on a country's motivations and framework conditions

Motivations (i.e. the “why” of auctions)

- Contracting the cheapest RE projects possible
- Allocating available funding efficiently
- Reliably achieving an RE target
- Ensuring security of supply
 - Investing in RE technologies and so diversifying the electricity mix
 - Ex.: Zambia (95% hydro) and Peru (47.6% hydro) invest in solar to ensure security of supply even when water inflows are not adequate to meet national power requirements

Motivation for auctions may be similar but framework conditions vary

- The market and regulatory environment need to be considered in the design of auctions, since there is no one-size-fits-all solution
- Key considerations:
 - Existing regulations & incentives for RE: compatible with auction?
 - Access to finance may be difficult: financial institutions may not see RE projects as bankable.
 - Project development & operation phases: comparable between projects? Measurable?
 - Project risks: low enough for the auction?



2. Factors influencing auction prices

Resource potential

- The higher the solar irradiation level in a country, the higher the yield
 - Zambia has over 2,000 kWh/m²/year on average, reaching up to 2,300 kWh/m²/year in the northern areas
 - Peru has over 1,820 kWh/m²/year on average, with up to ~2740 kWh/m²/year in highlands
 - For comparison: Germany has 1,055 kWh/m²/year on average

Development of solar PV in places with relatively low irradiation is also possible, since financing costs are an important parameter of LCOE. (WBG 2017).

Therefore, policy makers have an important role to play by de-risking projects and enabling access to low-cost capital (see example of Zambia)

Reductions in equipment costs & efficiency gains

- The global costs of PV modules and inverters have fallen steadily over the past few years (BNEF 2016), with further cost reductions in 2017
 - Modules: from \$1.32/W in 2011 to \$0.40/W in 2016
 - Costs of inverters for grid-connected systems fell about 40% between 2014 and 2016
- Equipment costs represent an important part of total investment costs (WBG 2017)
 - Module costs typically represent 1/3 of the total cost
 - Plant equipment (auxiliary and supporting equipment) represents about 60% of total costs.

Level of perceived risk and cost of finance

Off-taker risk

- Dispatch risk:
 - Risk that the off-taker may not dispatch the generating facility.
 - Potential conflict of interest to give preference to its generators rather than to independent power producers if surplus supply exists.
- Credit risk
 - The relevant off-taker must be able to pay for the electricity the project is providing.
 - Lenders may therefore require that the off-taker have a minimum credit rating

Political risks may also be an issue

- E.g. expropriation, transfer restriction, war/civil disturbance, contract breach

Other risks include: foreign exchange rate and inflation risks, force majeure (during construction or operation)

Level of perceived risk and cost of finance

Zambia is one of the four countries part of the WBG' Scaling Solar initiative supporting solar in emerging markets struggling to develop utility-scale solar power.

Scaling Solar is a “one-stop-shop” for Governments to rapidly mobilize competitive privately funded grid connected solar projects

Problem	Solution
<p>There is a high perceived risk and cost of capital in Zambia</p> <ul style="list-style-type: none">• Zambia is ranked 98th in the Doing Business report (WBG 2017).	<p>Political Risk Insurance: Insures up to specified amount for losses due to unforeseen political risk</p> <p>Partial Risk Guarantees: Reduces off-taker credit risk with upfront term sheet limited to amount needed for bankability</p> <p>Stapled financing with detailed project finance term sheet offered to all pre-qualified bidders</p>

Stable regulatory framework

- RE targets are an important signal of long-term demand for RE capacity/energy by the government.
- Targets embedded in national energy plans provide confidence to investors, and enable the construction of a project pipeline.

Zambia

In Zambia, 600 MW will be auctioned in several auction rounds (IDC 2017): Round 2: 150MW - 250MW, Round 3: remaining 250MW - 350MW.

No schedule of auctions has been set yet, though this initial announcement was made

Peru

Calls for RE auctions every 2 years from 2008 to date.

Auction round in 2017 postponed to 2018 due to an assessment by the government of the state of project realization.



3. Success factors and barriers in auction design and implementation

Encourage high level of participation to achieve sufficient level of competition

Zambia

The auction attracted 48 solar power developers: 11 were qualified, and seven submitted final proposals (bids).

Bidders	Description	County (domicile)
Access / Eren Zambia I	Dubai-French consortium	France
EDF Energies Nouvelles	Development spinoff of utility EDF	France
Enel Green Power S.p.A.	Development spinoff of utility Enel	Italy
Mulilo Zambia PVI Consortium	Project developer from South Africa	South Africa
Globeleq	London-based Africa-focused developer	United Kingdom
NEOEN S.A.S. / First Solar Inc.	French developer NEOEN and US thin-film manufacturer partnership	France
Shanghai Electric Power / AVIC	Chinese consortium of utility and (presumably) aviation firm	China

Peru

All auction rounds have been oversubscribed (i.e. GWh offered > GWh contracted)

E.g. 4th auction round (2016): offer was 16 times higher than contracted volume



Auctions introduce risk and transaction costs for bidders and regulators

Example from Peru

Problem	Solution
<p>Risk of bidders excluded in the first rounds due to formal errors</p> <p>Not attractive for foreign investors</p>	<p>The design and management of the auction scheme is very simple which benefits:</p> <ul style="list-style-type: none">• the project developers : low administrative barriers and transaction costs• the auctioneer: very limited resources needed to design and manage the auction.

Responsibility for site development

Example from Zambia

Problem	Solution
<p>Weak institutional capacity in the energy sector</p> <p>Lack of assessments of the stability of the grid</p> <p>Obtaining administrative permits is burdensome</p>	<p>Initial feasibility studies, site selection and legal due diligence 'fronted' by the WBG.</p> <ul style="list-style-type: none">• Technical project preparation helps lower project risks <p>Land is provided for free by the Zambian Government</p> <p><i>Trade-off:</i> Increases the burden on the government and reduces the role of the project developer to search for the optimal sites</p>

Encourage a high realization rate of winning bids

Example from Peru

Problem	Solution
<p>Success rate of projects starting operation on time is still not satisfactory. Not all RE projects selected in 2016 are currently being realized</p> <p>Low level of technical pre-qualification requirements may have increased the risk of delays and nonexecution in the construction stages, despite stringent bid bonds and penalties</p>	<p>Ministry of Energy is considering to require projects be in a more advanced stage of development by the time of the auction.</p>



4. Key messages

Key messages

- Auction design depends on a country's motivations and framework conditions. Motivations for auctions may be similar but framework conditions in developing countries vary.
- Resource potential, reductions in equipment costs, stable policy framework, and limiting risk for projects allow more competitive auction prices
- Risk should be allocated to the party best equipped to deal with them.
 - This can include the pre-development of the site (e.g. feasibility studies) by the government, and fast-tracked permitting process, which reduce risks for the project developer
 - Yet it increases the burden on the government, and reduces the role of the project developer in search for the optimal sites
- Policy makers have an important role to play by de-risking projects, and ensuring auction rules are clear, transparent, and easy to understand
- Policy makers have to adapt the auction design to the policy goals and the market environment as there is no one-size-fits-all solution



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