Renewable Energy Auctions: the Brazilian Experience

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Brazil has one of the “cleanest” energy matrices in the world, with about 45% of the overall energy production coming from renewable sources

- The worldwide average is about 15%

The power sector is even “greener” – more precisely, “bluer” – with 80% of the country’s 120,000 MW installed capacity coming from hydropower

- Large plants in cascade over different basins
- Large reservoirs
- Hydropower is an essential resource for the country
The new renewable energy sources (RES)

► In the past five years, three other renewable resources have become competitive for large-scale generation expansion:

1. Bioelectricity (BE): cogeneration from sugarcane bagasse
2. Small hydro
3. Wind power

► Hundreds of BE, SH and wind plants, totaling 6,000 MW, are already in operation; an additional 7,000 MW is under construction

► And they have other interesting attributes
Interesting attributes of RES

- Brazil has a significant resource potential of these sources
- Geographical complementarity: wind (South and NE) & BE (SE)
- Smaller-sized projects: diversify risks of delay, increases investors range
- Shorter construction time: hedges load growth uncertainty
- Location close to load centers
- Brazil’s hydro reservoirs and the countrywide transmission grid provide flexibility and modulate seasonal and intermittent production
- Production complementarity with hydro:
  - Hydro and wind (in the Northeast)
  - Hydro and bioelectricity (in the Southeast)
Brazil has different support mechanisms, which co-exist:

2. (from 2007) Incentives on wire costs for selling energy contracts at the free market
3. (from 2007) Technology-specific auctions

- Tax breaks & local (BNDES) incentivized financing offered
- The main support mechanisms are (1) and (3) and they will be discussed next
Created in 2002, mandatory contracting of 3,300 MW of RES until Dec 2006 through a 20-year contract

- 1,100 MW for wind, small hydro and biomass
- Cost of these contracts collected from all consumers through a levy
- Consumers entitled to portions of Proinfa energy (in proportion to actual consumption) in their contract portfolios.
- Eletrobras (federal power utility) centralizes payments.

“FiT-like” program: each technology receives a fixed price

- Wind: 184 USD/MWh, SH: 96 USD/MWh, Bio: 70 USD/MWh

Proinfa started the RES business in Brazil
Difficulties with Proinfra

- Economic value: information asymmetry between suppliers & government
- Criterion to select projects: date of the project’s environmental permit
  - The older the permit, more priority the project had in the merit order for contracting → “black market” for environmental licenses.
- Difficulties to manage grid connection
- BNDES required 60% of the project’s costs to be supplied by local manufacturers: deadlock for wind, as Brazil had only 1 supplier at the time
- Proinfra’s implementation delayed several times; still not fully completed and completion postponed for the 6th time now to 2012
The path towards RES auctions

- Contract auctions are integrated into the regulatory framework since 2004
  - Brazil runs an organized market to auction *firm energy* contracts to contract new energy for the regulated market (regulated consumers pay) or specific auctions to contract *supplementary* generation to increase the security of supply (all consumers pay)
  - Original motivation was price disclosure and efficiency in the procurement process (reduction of information asymmetry)
- Since 2005, these auctions have resulted in the contracting of 31 GW of new capacity
  - 40% is conventional hydro & 20% renewable (60% renewable in total)
  - 40% is fossil-fueled, mostly natural gas
  - US$ 300 billion in contracts
The organized contract auctions for new capacity

 ► Regular (yearly) auctions exclusive for new energy
  ▪ Discos declare the volumes to contract (regulated consumers pay) and a centralized procurement (economies of scale) is organized by the government
  ▪ Standardized long-term energy contracts offered, backed by firm energy
  ▪ Technology-neutral but the government can interfere in the candidate projects with policy decisions:
    • has been used to organize project-specific auctions (e.g. large hydros), to avoid oil- and coal-fired generation as candidate supply and to contract renewable

 ► “Reserve energy” auctions
  ▪ Contract supplementary energy to increase the system's security of supply
  ▪ Government defines the volumes to contract, all consumers pay for the energy
  ▪ Government can select the technologies that will participate, has been used to contract renewable
Outlook of the RES energy auctions

► Long-list of technical pre-requisites to register a project, e.g.:
  ▪ Prior environmental license, grid access, financial qualifications

► Specific products offered
  ▪ In case of wind, product converges to a FiT with some revenue stabilization and a complex scheme for penalties/incentives for production above/below a threshold

► Main auction tasks distributed among the institutions (an auction committee is formed) to allow coordination:
  ▪ Definition of auction mechanism & suggest price caps
  ▪ Definition of auction product, preparation of tender documents, etc
  ▪ Coordination with transmission planning
How to guarantee the projects will be build?

- Guarantees for new energy auctions: bid bond (1% of project’s estimated investment cost) & project completion (5% of project’s estimated investment cost)

- Regulator has the right to ask for contract termination if delay higher than 1 year is observed

- Several other penalties in case of delays
  - Reduction of contract price while plant is delayed
  - Depending on the auction type, it is needed to contract replacement firm energy during the delayed period
Technology-specific auctions results – wind power

PROINFA was the first RES support mechanism in the country and based on a feed-in tariff (administratively set)

* Wind competed against small hydro and biomass

** Wind competed against small hydro, biomass and gas-fired plants

Total of 6.8 GW of wind contracted in auctions @ 78 US$/MWh
2.9 GW @ for 60 US$/MWh (2011)
Problems observed and ongoing adjustments

► Some 40% of the wind projects of the 2009 auction are behind schedule (COD should be July 2011). Why?

► Delays in financing: BNDES is concerned about the financial situation of one contracting distco and requires higher guarantees
  ▪ This distco is one of the few remaining under state control (Amapá). It will probably suffer federal intervention for later privatization
  ▪ Affects smaller investors with less proven track records

► Delays in environmental licensing
  ▪ Lack of experience of investors (incomplete environmental studies) and lack of personnel from the environmental licensing agency
Main lessons

► Auctions do not operate in a vacuum: they must be an integral part of a country’s overall energy and procurement policies

► An effective auction depends on the existence of competition: attracting additional bidders are far more effective than limiting reserve prices

► Regulatory stability, transparency and the investors’ perception about the fairness of the process are pre-conditions for the success of an auction

► The product offered will depend on the auction objective and is a key of the auction success (risk allocation is everything)

► Stimulus for “early warnings” of problems & delays in project implementation should be so that the “bad news” can be known in advance

► There is no “one size fits all” type of auction design and the “devil is in the details”
For further reading*


5. F. Porrua ; B. Bezerra; L.A. Barroso; P. Lino; F. Ralston; M.V. Pereira, ,"Wind Power Insertion through Energy Auctions in Brazil" IEEE General Meeting, 25-29 July 2010, Minneapolis, Minnesota, US


* available at www.psr-inc.com
Backup
## Lessons learned: auctions (1/2)

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<th>Topic</th>
<th>Main Lessons</th>
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<tbody>
<tr>
<td>1. Auction-related Procurement and Energy Policy Aspects</td>
<td><strong>Auctions do not operate in a vacuum:</strong> rather they must be an integral part of a country’s overall energy and procurement policies</td>
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<tr>
<td>2. Market Context</td>
<td><strong>An effective auction depends on the existence of competition:</strong> it is widely accepted among practitioners that the results of attracting additional bidders are far more effective than limiting the reserve prices</td>
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| 3. Pre-conditions | **Regulatory stability is a key element** to attract investors to participate in competitive auctions  
**Transparency and the investors’ perception about the fairness of the process is a pre-condition** for the success of an auction |
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<td>4. General Design Issues</td>
<td><strong>There is no “one size fits all” type of auction design</strong>&lt;br&gt;&lt;br&gt;The <strong>product</strong> offered in an electricity auction <strong>will depend on the auction objective</strong> and <strong>is a key of the auction success (risk allocation is everything)</strong>&lt;br&gt;&lt;br&gt;<strong>Centralized auctions seem to be more efficient</strong> in fostering competition compared to carrying out various smaller auctions</td>
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<td>5. Technology Choice and Renewables</td>
<td><strong>Auctions have proved to be an alternative to the administratively set feed-in tariffs:</strong> indirect way for <strong>feed-in tariff price discovering</strong> but managing to reach the right amount of <strong>investment</strong>&lt;br&gt;&lt;br&gt;Moving from auction theory to real-life implementation is <strong>not an easy task</strong>, special care should be taken in <strong>markets that are not fully functional</strong>, or <strong>where institutions are not strong</strong> enough to support any formal competitive electricity auction procurement schemes</td>
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<td>6. Implementation issues</td>
<td><strong>Governments have to specify who should be allowed to participate</strong> in the auctions among all potential buyers and sellers in the market&lt;br&gt;&lt;br&gt;Stimulus for “early warnings” of problems &amp; delays should be given so that the “bad news” can be known <strong>in advance</strong>&lt;br&gt;&lt;br&gt;The “<strong>devil is in the details</strong>” – well-specified auction rules are critical for the auction success</td>
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Tax breaks

- Waiver of taxes on equipment imports
- Special financing lines:
  - 70% leverage, 14 to 16-years amortization, 6-9% interest rate, 6-month grace period
Discount on T and D tariffs

- Up to 50% discount on transmission and distribution tariffs for free consumers who buy contracts backed up by renewable.

  1. Energy cost: 50 USD/MWh
  2. Wire cost: 80 USD/MWh
  3. Tariff (1+2): 130 USD/MWh

- A discount of 50% is 0.5 x 80 USD/MWh = 40 USD/MWh → an energy price of 80 USD/MWh could be offered for a renewable and would save 10 USD/MWh in the final tariff:

  1. Energy cost: 80 USD/MWh
  2. Wire cost: 40 USD/MWh
  3. Tariff (1+2): 120 USD/MWh