Markets Abroad: Learning by Looking
The Brazilian Experience in the Electricity System

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Overview

• Brazil
  • Population: 210 million (2019)
  • Area: 8.5 million km²
  • GDP per capita: $ 8,717 (2019) down from $9,000 in (2018)

• Brazilian Power System
  • Predominantly Hydro participation
  • Vast Transmission Grid
  • Universal Access to Electricity

Total Installed Capacity in the Power System (2020)
Gradual loss in regularization of storage capacity in reservoirs

- Lower regularization of reservoirs’ capacity implies smaller ratio between amount of energy stored (reserves) and annual demand (no. of months).
- The lower ratio indicates the need for adding other generating sources.
- The hydropower platform is not fully used and optimized due to lack of incentives.

Source: Own elaboration based on ONS data

Loss in regulation capacity in hydro reservoirs in Brazil
Electricity Tariffs for Residential Customers 2017
European prices in a middle-income country

Data Source: ABRACE/2017
The RESEB Project (Coopers&Librand) presented two possible approaches to electricity prices formation (Working Paper A1):

**Option 1:** System dispatch based on technical plant data only (...) There would be central determination of water values and of Wholesale Energy Market prices.

**Option 2:** System dispatch based on water values determined by generators themselves, involving a considerable degree of generator self dispatch. The Wholesale Energy Market price would be calculated on the basis of bid data.

**Option 1 was chosen!**
National Grid

- Adopted the ISO Model - separated from the Market Operator
- Centralized grid planning
  - BOOT auctions have attracted investments
- TRANSCOs’ compensation based on guaranteed revenues linked to availability
- Zonal pricing (four zones)
  - MC calculated in approximately 7,000 nodes

Source: ONS (www.ons.org.br)
Markets & Risks Allocation

Markets

• Two Contracting Environment with competitive doors:
  • Competition for the market based on long-term PPAs auctions (20-30yrs tenor indexed by inflation, some technology specific) - not a single buyer
  • Competition in the market - Large C&I consumers can contract in the Free Contracting Environment
• Cost-based dispatch with differences settled at PLD value (Spot “price”)
• Distribution (wires and energy bundled)
  • High-powered incentive regulation to set tariffs - energy costs passed-through to consumers.
  • Highly distortionary cross-subsidies - virtual net-metering included.

Risks

• Risks borne by the end-user in a highly centralized contracting environment
• MRE: risk sharing mechanism among hydro power producers to tackle externalities from GenCos in the same cascade
  • Dysfunctional today due to climate variability affecting river flows
Two Decades of Electricity Reforms in Brazil

1992-93
- Early steps in reforming the power sector towards market liberalization.
- Privatization
- Independent Regulation

2003-2004
- Reforming the Electricity Market (New Model)
- Accelerating universal access and distributive policies.
- Tendering PPAs

2012-2013
- Reform targeting 20% tariff reduction to improve competitiveness.
- The unsustainable measures were reversed in 2015.

Source: FGV CERI.
2020 Diagnostics: Market design not robust enough to address changes in critical underlying conditions

- Change in rivers inflow patterns due to climate variability magnified impacts from distortions associated with the MRE.
- Cost-based dispatch and pricing (PLD) are unable to reflect opportunity costs
- Regulatory interventions (price caps).
- Lack of retail competition and regulatory compliance means captive consumers do not observe prices that reflect opportunity costs.
- Inefficient and burdensome incentives and taxation regime.
Main Challenges & Emerging Trends

- Resilience to climatic variations:
  - Historical or past rain conditions may not be representative of future conditions.
  - Current dispatch solution relies on historical distribution of hydro conditions, not a forward curve to include climate variability.

- Increasing participation of VRE in the generation mix.

- New wave of liberalization pulled by consumers.

- The Gas Market Reform: attempt to implement a competitive gas market.
The 2018-20 Proposed Power Sector Reform: Conflicting intentions

• Addressing Resource Adequacy through **centralized contracting of capacity**
  • New and stronger **liberalization** trends undermine the ability of existing contracting mechanisms to ensure system expansion.
  • Proper design and implementation of energy and ancillary services markets are not at the center of discussions (or periphery).

• Phasing-out cross-subsidies to renewables.
• Privatization of Eletrobras through capital increase.
The Fork on the Road Ahead

- Markets as drivers of investment decisions
  - Bid-Based Dispatch - LMP?
  - Markets for energy, ancillary services, demand response, other dimensions (including dispatchability)

- Wave of liberalization and impacts on financiability
  - Sustainable and resilient investments & operations
Concluding Remarks

• The current market design is not robust enough to address changes in the underlying conditions at inception.

• Predominantly renewable power system in need to detach itself from highly centralized contracting environment.
  • New approach (RA management) based on old solutions (centralized capacity contracting) leads to known results
  • Proper design and implementation of energy and ancillary services markets is not part of the discussion.

• The recent transitory proposal allowing for capacity (reserve) auctions could become perennial.
Moment of Truth

One day Alice came to a fork in the road and saw a Cheshire cat in a tree. "Which road do I take?" she asked. "Where do you want to go?" was his response. "I don’t know," Alice answered. "Then," said the cat, "it doesn't matter."
Thank You!
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