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## **Open Access to Power Grids** International Experience



## Why this study was done

- Efficient and reliable electricity supply is a key factor of economic growth.
- Power grid infrastructure (Transmission and Distribution = T&D) can be a bottleneck or an efficient delivery mechanism.
- India:
  - Grid development is a national priority
  - Open Access (OA) to power grid is a component of power sector reform
  - High expectations since Electricity Act 2003
  - Interest in experience of countries that made it work



#### **Country Studies**

#### 2012-2013

International Experience with Open Access to Power Grids

Knowledge Series 016/13



- Brazil
- Peru
- Turkey
- India
- Philippines
- USA and Europe



#### What is Open Access?

#### POWER SECTOR STRUCTURE ALLOWING OPEN ACCESS TO GRIDS



C = Consumption; D = Distribution; G = Generation; S = Supply (Trade); T = Transmission Font coding used for market levels:

Bold G, T, S, and D = Wholesale Bold Italic C = Contestable retail (open access eligible) Plain C = Captive retail

#### Open Access =

 Possibility for any party selling or buying electricity to use T&D systems:

•Without discrimination

•Subject to transparently formulated systemsecurity constraints

•Against payment of adequate fees



## Why Open Access is worth pursuing



- Open access facilitates expansion of competitive wholesale markets
- Open access facilitates participation of contestable retail consumers in the competitive market
- Competition spurs efficiency and economic growth
- In turn, more competitive markets require more sophisticated forms of open access



#### Why Open Access is worth pursuing (cont'd)

#### BRAZIL'S ELECTRICITY MARKET DIMENSIONS



Source: Luiz Eduardo Barata Ferreira 2013



#### Brazil's competitive electricity market: the buy-side

•On the Free Trading Floor, free consumers represent over 60 percent of all purchase transactions (right panel).

•The number of free consumers has been growing steadily over the long term (left panel).





# Free trade in electricity in two large emerging market economies: Brazil vs India



India	Brazil
Total installed capacity: 263.4 GW of which 34.4 GW is self-generators	Total installed capacity: 121 GW
Power flows enabled by Open Access are 15% of total generation	Free consumers are 26% of total consumption
Self-generators: 110 TWh or 89% of OA flows	Self-generators: 40.8 TWh or 23% of power purchases on free trading floor
Power exchange (day-ahead) and bilateral transactions: 13 TWh or 11% of OA flows	Free consumers: 109.4 TWh or 61% of power purchases on free trading floor



## Why Open Access is worth pursuing (cont'd)

#### Open Access and active wholesale market help mobilize private investment

#### in generation

- Turkey increased its installed power from 31.8 GW to 53.4 GW (2003-2011).
- More than 70 % of the increase came from private sector.

•Note: Except for the renewable energy feed-in tariffs, this investment was realized under competitive market conditions without any take-or-pay guarantees. Turkey: Capacity and ownership of power plants commissioned annually in 2003-2011



#### Source: Dilli 2012 based on EMRA- MENR- TEIAS



### Why Open Access is worth pursuing (cont'd)

#### Advantages of a Market Structure with Open Access

Rich variety of power supply contracts taking advantage of load, time, and location differences

More opportunities to connect at desired voltage level

Greater exchange of power flows across country or region

Better utilization of self-generators' capacity

Greater supply diversification through small distributed generation

Improved reliability of power supply

Potential credit enhancement factor

Competitive pressure on incumbent distribution utilities

These conditions spur cost reduction, increase quality of service, introduce new products and services, and stimulate investment in generation and grid infrastructure



## Why Open Access is not easy to achieve

- Creating a well functioning open access regime usually requires:
  - Unbundling generation from T&D;
  - Effective regulatory oversight to enforce nondiscriminatory access to the grid;
  - Efficient and predictable pricing of grid services;
  - Transparent and effective network congestion management; and
  - Safeguards against opportunistic behavior by incumbent
    T&D operators having potentially strong incentives to inhibit entry.



#### • Challenges of Unbundling:

- Entrenched monopoly interests blocking market entry for third parties
- Special case: distribution-level unbundling, where the distribution companies hold a joint license for the network service provision and retail sale of electricity.
  - **Resistance to switching**: Distribution company resisting open access for fear of losing high-paying industrial and large commercial consumers (India).
  - **Resistance to connection**: Distribution company reluctant to connect new consumers who wish to procure energy elsewhere (India).
- Government charges on open access: e.g., cross-subsidy surcharge in India.



- Governance Issues. Many developing countries lack the institutional governance structure necessary to successfully enforce open access, even if the legal framework is in place.
  - E.g., the state intervenes in electricity market operations, the regulatory bodies at a subnational level act in ways substantially deviating from the national law, or proper guidelines for OA implementation are lacking.
  - Other regulatory and technical issues specific to open access in distribution such as stand-by arrangements, metering, and billing.



- "Coping with Success": Demand for new connections, especially from generators, can overwhelm the limited resources of the grid and its operators (*Turkey*).
  - With the introduction of open access, the transmission grid operator, Turkish Electricity Transmission Company (TEIAS), has faced thousands of requests from independent generation developers, with a total capacity of twice the existing installed power, asking for connection to the grid in a very short time.



- Planning Challenges:
  - Planning can no longer be confined to the utility level and must include many more players, such as IPPs, multiple buyers, and demand responders.
  - Planning is more challenging when consumers connected to distribution systems leave the franchise area too frequently or unexpectedly, e.g., large retail customers arbitraging between the regulated and free markets.



- Small Distributed Generators:
  - In some countries, small distributed generators accessing the distribution grid have become part of the open access policy package.
  - Distributed generators contribute positively to supply diversification.
  - However, such policies pose challenges related to planning as well as technology.
    - Strengthening the medium- and low-voltage network, as well as new operational procedures, are required.
    - Technology for metering and billing for reverse flows.



- Cases of Reintegration.
  - Just as resistance to unbundling is an obstacle to open access, so is the reversal of unbundling (i.e., "rebundling" or "reintegration").







- Political Commitment:
  - The government should commit to allowing multiple generation companies, including private generators, to operate in the sector.
  - A proper communication strategy may be required to get popular support for reform, with an emphasis on the benefits of competition for the consumer.



- Legislation:
  - Legislation that mandates open access and supports competition, as well as regulations such as grid code and transmission pricing.
  - Law on power sector concessions, or similar legislation.
  - Law must have specific provisions for open access to T&D, including provisions for tariffs.
  - Legislation requiring separate contracting for energy and network services.
  - Prohibition for T&D companies to engage in generation (recommended).



- Sector Regulation:
  - Trustworthy, technically strong, and autonomous regulatory body committed to expanding and protecting competition.
    - Ideally, the regulator is operationally and financially independent from the government, and its governance structure is designed to support such autonomy.
  - The level of regulation should be commensurate with the level of market served and service provided.
    - In a federal state, this means that a national facility should be regulated by a national regulator rather than state by state.



#### • System Operation:

- System operator should be independent from generation and supply interests, and that transmission businesses should not intervene in electricity sales.
- Two successful models of independent system operation are utilized internationally: the transmission system operator (TSO) and the independent system operator (ISO) model, found in parts of the Unites States and in some emerging economies, including Brazil and Peru.



- Sequencing of Implementation Phases of Open Access:
  - Early introduction of institutional components, such as the independent regulator and system operator.
  - Granting open access to the grid from large-scale to smallscale market participants (wholesale- to retail-market levels).
  - Once initial version of the competitive wholesale market is launched, additional features can address congestion management, locational price signals, demand response, ancillary services, and higher standards of transparency.



- System Planning:
  - While the emphasis in introducing open access is on greater competition, recent experience in several countries highlights the importance of properly balancing competition with centrally directed system expansion.
  - Private-sector investors in both transmission and generation react positively to the transparency and predictability of a well-organized system-planning framework.



### **Our Recommendations**

#### • Finding a Suitable Model:

 First of all, the country needs to decide on the model of open access it wants to pursue. Different levels of open access may be envisaged—from a minimalist approach, which simply establishes the legal right for generators to access the grid in order to sell their capacity and energy, to more sophisticated models, aiming to put pricing signals to work and remove arbitrary influences from the marketplace.



### Our Recommendations (cont'd)

- Sequencing Wholesale and Retail Open Access:
  - Access to the transmission grid by wholesale market participants is an area where markets can be put to work more readily, thus offering the best initial opportunities for improved market efficiency. This is also where opportunities for progressively more sophisticated market designs are found.
  - Retail open access, and especially access to distribution grids, appears to pose more challenges than wholesale access to transmission.



### Our Recommendations (cont'd)

#### • Unbundling and Revenue Separation:

- An effective open access regime requires a clear focus on the provision of the network services as a distinct area of business operations.
- This is best achieved by unbundling transmission from generation and precluding it from association with any other energy suppliers or traders. The transmission service provider should not be concerned with revenues other than those related to network service provision.
- For distribution companies:
  - Separate license for distribution and retail sale
  - Decoupling revenues from energy throughput.



### Our Recommendations (cont'd)

- Contestable Retail (Industrial) Consumers:
  - A policy decision to consider is whether or not to compensate the distribution company for losing such consumers to open access.
  - The recommended approach is to allow such consumers easy exit from the local grid, but limit their ability to move repeatedly between the regulated and deregulated markets:
    - Advance notice for returning to regulated market; and/or
    - Incremental cost recovery from a returning consumer.







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# Thank You.

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