

developing countries

restructuring with benefits from competition (or not)

MANY DEVELOPING COUNTRIES in Asia, Africa, Eastern Europe, and South America are freeing up their electric energy industries in search of benefits from competition. This activity is more pronounced in Eastern Europe because restructuring of the electric energy industry is a requirement for

accession to the European Union (EU). Some developing countries in Asia are restructuring without any plans for eventual introduction of competition.

A considerable number of developing countries are on a fast-paced plan to implement restructuring, despite the fact that the benefits from restructuring

are yet to prove themselves in the more developed countries such as the United States, Western Europe, and Australia.

The challenge among the developing countries is to develop a balance between introduction of competition, regulation, and command and control, which is not a trivial task. The lessons of the California energy crisis of 2000 and 2001 are tilting the balance more toward command and control. Recent trends in restructuring within the developing countries reflect that government control and monopoly is being maintained in some form, even after unbundling the traditional functions of generation, transmission, and distribution. Retention of command and control

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is being justified as a measure to prevent runaway costs.

Key Considerations in Restructuring

Developing countries need to conduct a comprehensive analysis and address a number of key considerations before proceeding with the decision to restructure their electric energy industries. These considerations include the following:

- ✓ Prepare and approve an energy policy stating the intended goals of restructuring; specifically, the national and social goals to be achieved by restructuring and the required implementation time frame must be addressed.
- ✓ Implementation of restructuring can start only after effective legal, regulatory, and oversight institutions are in place.
- ✓ A gradual implementation plan is recommended. Depending on availability of the supporting infrastructure, 8–15 years is recommended for planning full implementation.
- ✓ The structure and design of the markets for any developing country must be consistent with other regional markets to promote cross-border trading.
- ✓ Competition in electricity markets can place “long-term” downward pressure on prices with measurable benefits in cost and efficiency. However, the risks and “short-term” cost of market introduction can be considerable.
- ✓ Restructuring an electric energy industry costs public funds and has financial risks. Developing countries need to assess the ability of their economy to absorb the short-term increases in costs to realize the potential benefits.
- ✓ Introduction of competition can generate stranded assets and lower asset valuations resulting in the inability of investors to pay debts. This can create bankruptcies of companies, as governments witnessed in California.
- ✓ If the government subsidizes the electricity rates, the cost of the subsidies must be accounted for in determining the true cost of providing service.
- ✓ If the current prices in generation are already close to production cost, the introduction of competition, which also has a cost, is unlikely to create tangible benefits.
- ✓ Unbundling of services is a necessary step in restructuring. Development of cost-reflective



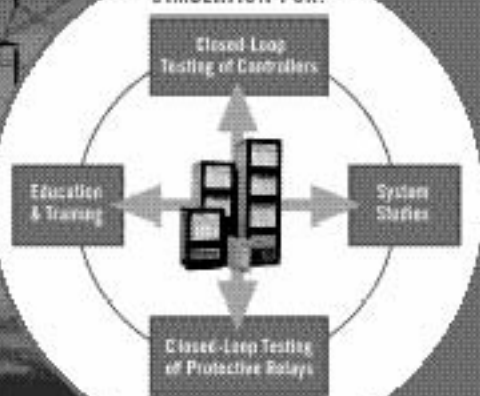
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transmission and distribution tariffs are required to identify the contribution of each sector to the overall cost of providing energy.

- ✓ The competitive potential of transmission and distribution sectors needs to be examined separately in addition to that of the generation sector. In addition, it is necessary to assess the impacts of restructuring within each sector individually.
- ✓ The short-term cost of competition in generation can compromise other traditional objectives of a power grid, such as justification of investments to construct new generation capacity and transmission and distribution reinforcements.
- ✓ Restructuring requires effective metering and high customer payment discipline.

Key Considerations in Selecting Market Structure

Developing countries must evaluate a number of considerations before selecting a specific market structure and proceeding with development of market design, rules, and protocols. These considerations include the following.

- ✓ Before selecting a market structure, it is absolutely necessary to undertake a comprehensive cost-benefit analysis within each sector to ensure that the overall benefits are commensurate with costs.
- ✓ Many developing countries experience double-digit load-growth rates. Such growth rates require a market, which provides an attractive investment environment and encourages new investments in the generation sector.
- ✓ There is no one-size-fits-all

model that meets the needs of all developing countries.

- ✓ Simple market structures, in many circumstances, can deliver similar benefits to more complex market structures. Developing countries should avoid complex market structures.
- ✓ Many developing countries suffer from substandard voltage and frequency regulation and lack a modern control center. The day-ahead and hour-ahead and real-time forward markets that are used in the developing countries cannot be easily implemented in developing countries with insufficient capacity for governor action and lack of automatic generation control (AGC). Market structures and designs which require frequent schedule changes (i.e., hourly) are not recommended for the developing countries. Longer procurement cycles such as weekly or monthly are more appropriate.
- ✓ Available transmission capacity and infrequent congestion is a key requirement for viable electricity markets. It is recommended that developing countries ensure availability of in-area and inter-area transmission capacity by assigning “must-run” resources. A market mechanism for managing transmission congestion is not initially recommended.
- ✓ To avoid creating the potential for corruption and favoritism, market structures should not rely on unsupervised negotiated procurements, closed bidding, etc.
- ✓ Extensive use of long-term power purchase agreements (PPAs), are not recommended. These agreements can reduce the size of the electricity markets to an extent that a demand-supply economic model is no longer viable.
- ✓ Developing countries need reference prices for local and regional energy. In many developing countries, such prices for energy

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have not been established and a price discovery mechanism may be lacking. Introduction of a simple pool auction or power exchange (PX) can facilitate the creation of the much needed reference price.

- ✓ The financial stability and health of the key organizations, such as the transmission system operator (TSO), is critical to the success of any market structure. Government or financial institution guarantees may be necessary to remove any concerns over the ability of the TSO to pay.
- ✓ Successful implementation of "Retail Access" requires an established, workable, and stable wholesale market. Privatization of the distribution system is simply at its early stages of development and its concept is not yet viable for the developed as well as the developing countries.
- ✓ For countries that are net buyers of energy, the market structure and rules need to encourage participation and promote cross-border trading.

Common Market Structures

The following three market structures are commonly used in the developing countries: negotiated third-party access (nTPA), regulated third-party access (rTPA), and single buyer model (SBM).

Each model is described briefly and is ranked according to suitability for the developing countries. The most commonly adopted market structure, namely the single buyer model, is described in detail.

Negotiated Third-Party Access

The nTPA market structure is shown in Figure 1. Under this structure, competition is created in the generation sector. The private generators would have to negotiate with the transmission company, which may have its own generators with competing financial interests. The negotiation includes transmission

access and sale of energy. The consumers remain regulated. The financial risks associated with nonviable investments remain with the private generator. This model offers exceptional versatility because it is based on negotiation and offers flexibility in cost.

The successful implementation

requires strong institutional requirements including a strong antimonopoly regulator and an effective oversight agency. Every negotiated agreement will have to be closely examined to avoid favoritism and corruption, preventing increased costs to consumers. As a result of strong institutional



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requirements and many possibilities for abuse, nTPA is the least suitable for developing countries.

Regulated Third-Party Access

The rTPA market structure is shown in Figure 2. Under the rTPA market structure, the transmission company publishes transmission tariff and access requirements so that generators may enter into agreement with the eligible customers. The eligible customers can directly negotiate with the generators. Under this alternative, the remaining customers are charged a cost-based rate by the regulator based on presumably optimal operation. Under the rTPA, the regulator observes the merits of the resources, such as hydro, thermal, and IPPs under very tight regulation. In addition to the regulated market, a spot market may also be created for real-time operation with marginal cost pricing. With this model, competition is created to some extent at the generation level (despite tight regulation) and at the retail level.

The rTPA does not offer a level playing field due to lack of a central market, with transparent rules and a single price for all. This model has the tendency to

promote long-term power purchase agreements with inflated prices, which can promote corruption and shield the generators from true market risks. The end result can be unfavorable retail prices and a noncorrectable financial scenario for the duration of such contracts. In addition, the rTPA tends to favor larger customers with more buying power able to access cheaper energy (cherry picking), thereby increasing costs (more expensive energy) to the remaining captured customers. This can create civil and financial problems for a developing country where poverty and low payment discipline are preexisting problems.

A highly effective contracting discipline and regulatory and oversight body are the key requirements for successful implementation of rTPA. The challenge for these organizations is to

Three market structures are commonly used in developing countries: negotiated third-party access, regulated third-party access, and single buyer model.

develop a balance between regulation and competition. The rTPA is a favorite market design model in Europe and has been adopted by Romania, Poland, and the Czech Republic. The rTPA may be viewed as an acceptable model for developing countries; however, special circumstances of the country under study will have to be considered before the rTPA can be adopted. The World Bank and recent EU directives favor rTPA.

Single Buyer Model

The SBM is the most commonly adopted market structure in the developing countries and first started to appear in the developing countries in the 1990s. The SBM is often used in the developing countries as the first step in restructuring with subsequent plans to introduce competition. Developing countries argue that SBM provides the means for private investment to save public funds that may otherwise have to be used in construction of power plants.

Under the SBM, an independent TSO may be created. The term “independent” is meant to reflect the fact that the TSO must not have ownership interests in any generation or transmission company and shall treat all suppliers equally and by the same set of participation rules and standards.

The TSO acts on the behalf of all customers and is provided the exclusive rights to buy and sell energy to the distribution company, who, in turn, sells it to the customers. The consumers are then charged for the purchase price of electricity along with transmission and distribution costs. The TSO may procure energy either through contracts with the

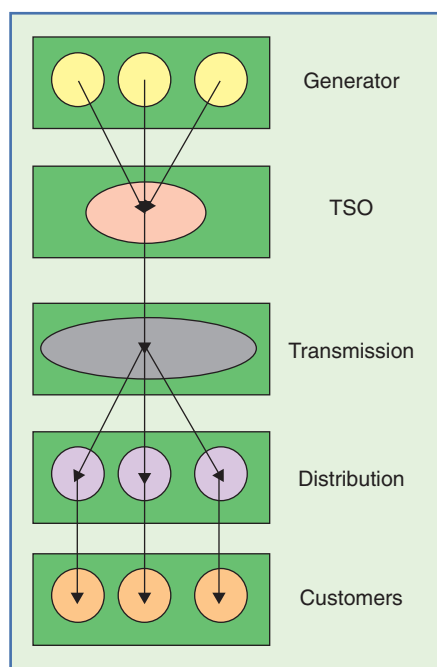


figure 1. The negotiated third-party access market structure.

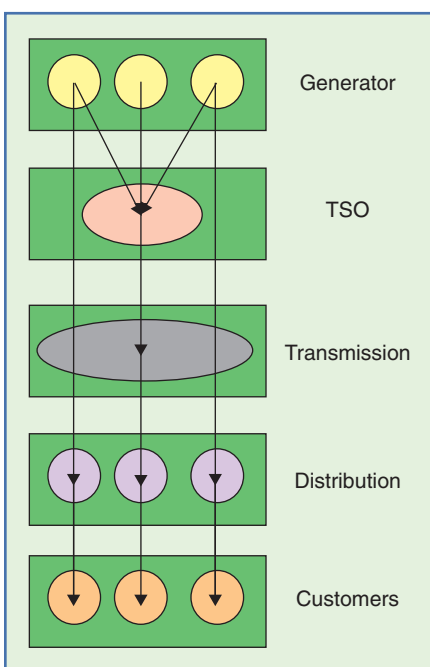


figure 2. The regulated third-party access market structure.

suppliers or through competitive forward markets. The customers remain regulated and are not generally allowed to leave their traditional supplier until the implementation of further steps in restructuring. This is graphically illustrated in Figure 3.

The SBM has been adopted by Hungary, Moldavia, Bulgaria, Slovenia, Lithuania, and India.

Other business models are also possible, where the TSO actually owns the transmission system. Business models with different governance and market structures have different pros and cons.

Adoption of the SBM in developing countries has been subject to criticism for a number of reasons, including lack of transparent and solid institutions and low payment discipline. Yet, it is considered the most common model for restructuring traditional vertically integrated electric utility industries.

Plausible criticisms of the SBM include the fact that the TSO may not have proper incentive to buy energy from the most economical resources and may exercise favoritism. These criticisms can be rectified in two ways.

- ✓ First, by creating a competitive wholesale forward pool auction (PX) with transparent market rules. The TSO is then obligated to procure its needs from the PX at market-established prices.
- ✓ Second, by creating regulatory and oversight committees that monitor the daily operation of the TSO and the market participants.

Once created, the TSO prepares clear and transparent bidding, scheduling, and settlement protocols and pre-qualifies the participants of its markets. Acting on the behalf of all customers, the TSO forecasts its demand, conducts the necessary markets in a least-cost

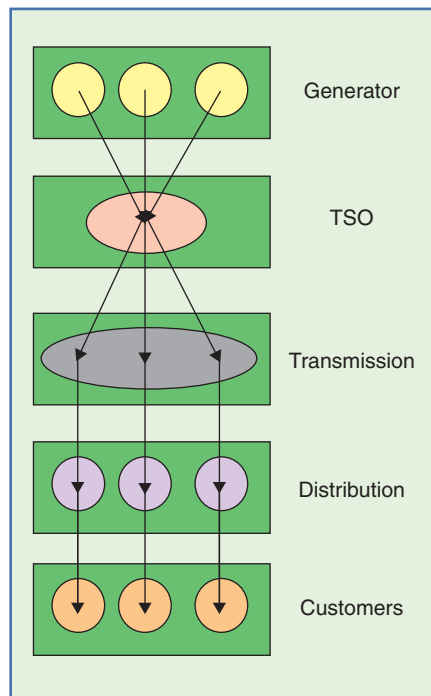




figure 3. The single buyer model.

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fashion, procures energy and other services, operates the power grid in real time, and performs the necessary metering, energy accounting, and financial settlements functions.

The TSO needs to publish timely market information such as expected procurement levels, actual procurements, prices, total costs, trends, etc. This is known as the "market information dissemination" function. The market participants use this information to develop bidding and scheduling practices that are consistent with their business strategies. The regulatory and oversight committees monitor the markets and identify and establish flaws in the market design and detect gaming and unacceptable participant behaviors. These organizations may go to the extent of rescinding payments and assigning penalties and sanctions to market participants with repeated viola-

tions of unacceptable behavior. The World Bank and recent EU directives do not favor SBM.

Conclusions

Restructuring and privatization of the electric energy industry is proceeding despite the negative impacts of the California energy crisis of 2000 and 2001.

The United States and some Western European countries have developed complex market structures and models for restructuring and privatizing their electric energy industries. Many of these developments have been implemented at a relatively fast pace. Developing countries are recommended to avoid fast-paced plans to implement restructuring without a clear objective and established realization of benefits.

This article provides two checklists; one for deciding whether to pro-

ceed with restructuring and a second for consideration in selecting suitable market structure and rules. It is recommended that developing countries use these two checklists in a due-diligence process to ensure that the expected benefits from restructuring and privatizations are commensurate with its risks and costs.

The market rules and protocols of the more developed countries may not fit the needs of developing countries. Developing countries should avoid complex market structures and rule because it will require long implementation time, expensive software, extensive IT infrastructure, and retraining of staff. Although there is no one-size-fits-all model, often, simple market structures and rules can result in many of the benefits of the more complex ones.

It is important to note that market rules and protocols cannot be developed

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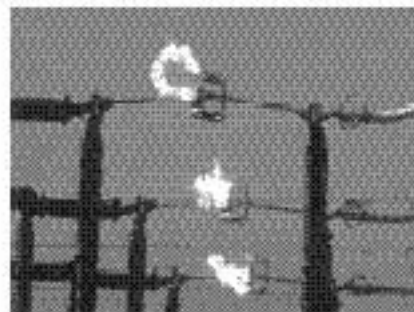
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in a vacuum and the markets rules and protocols of the neighboring countries must be taken into account. This is especially important if the country under consideration requires energy through imports.

For Further Reading

Power Applications and Research Systems Inc. [Online]. Available: <http://www.parsenergy.com>

Biography

Eddie S. Dehdashti is the president and founder of Power Applications and Research Systems (PARS), Inc., a consulting firm providing services in the area of transmission systems and wholesale electricity market design and operation. He has over 22 years of experience in transmission planning, design and operations and over seven years of experience with restructuring and wholesale electricity markets. While at the Pacific Gas and Electric Company, he partici-

pated in WECC (Formerly WSCC) activities for modeling, analysis and operation of the transmission systems in the Western States. He was a participant in the WEPEX process in California which led to the creation of the first Independent System Operator in the US. He has designed and developed many

software tools and conducted numerous analyses for the California ISO in the areas of market operations, market operator tools, market monitoring and surveillance, compliance, load forecasting etc. He is Senior member of the IEEE and chairman of the IEEE special task force on energy trading.



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