

Restructuring the Electric Power Industry: A Global Overview and Implications for Northeast Asia

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HISTORICAL DEVELOPMENT OF THE ELECTRICITY INDUSTRY

Historically, electric utilities in most regions of the world have been state owned or economically regulated entities because of the capital intensity of the industry, the natural monopolistic characteristics of power systems, and the importance of electricity to economic development and societal welfare.

Furthermore, they are largely vertically integrated, because of the economic efficiency and planning coordination of such centralized systems.

MAJOR DRIVING FORCES FOR ELECTRICITY INDUSTRY RESTRUCTURING

In recent years, there have been many changes in the driving forces that have promoted the restructuring of the traditionally vertically integrated industry:

Technological

The advances in gas turbine combined-cycle (GTCC) generation technology have resulted in electricity generation costs that are much lower than those of conventional power generation technologies and, thus, in unstoppable competition in regions with abundant natural gas resources.

At the same time, rapid advances in information and communications technologies have made the complex electricity market competition process feasible and even practical.

Institutional and Economic

Growing inefficiency of existing electric utility, because of ineffective regulation or management, has caused public demand for reform, particularly among large customers that have been under the pressures of global economic competition to cut costs.

Ideological and Sociopolitical

Following the fall of the communist bloc in Eastern Europe, the market economy ideology has gained worldwide popularity. Even for the only remaining communist giant, China, the market approach has gained acceptance.

THE NEED FOR AND INTEREST IN ELECTRICITY INDUSTRY RESTRUCTURING IS REGION-SPECIFIC

Because of economic, cultural, sociopolitical, and geographic differences among various regions of the world, the need for and interest in electricity industry restructuring is highly region-specific. Furthermore, there are many alternatives in electricity industry restructuring, including:

- franchise competition
- competitive bidding of new generation capacity
- generation wholesale competition
- generation retail competition with mandatory pool
- generation retail competition with voluntary pool
- transmission and distribution competition.

As a result, the restructuring process varies among different regions and is evolving. For example,

- Chile uses a marginal cost bidding process that is similar to the merit order dispatching for a single generation company.
- The United Kingdom is changing from a mandatory power pool system into bilateral contracts.
- The California system separates power system operation and electric power exchange.
- Alberta in Canada uses competitive bidding of power purchase agreements to preserve existing utilities for gradual shift to full competition.
- Starting 21 March 2000, Japan is conducting a three-year pilot-project partial competition.

IMPLICATIONS FOR NORTHEAST ASIA

Northeast Asian countries have a somewhat unique situation with respect to electricity industry restructuring as discussed below. There are a number of similar conditions among these countries in favor of restructuring:

- general interest in market economy ideology
- widespread perceived inefficiency of existing utilities
- pressures by independent power producers and large customers for electricity utilities to be more efficient through competition.

On the other hand, there are also a number of common conditions calling for caution in the restructuring process:

- There is a shortage of generation capacity in many Northeast Asian regions that may cause market failure as well as rising and volatile prices in a competitive electricity industry.

- Restructuring may not resolve local opposition to power system expansion.
- The high cost of natural gas in most regions in Northeast Asia reduces the competitiveness of gas turbine combined-cycle technology, which is a major driving force for restructuring.
- Market competition needs to be harmonized with national policies on energy security and environmental emissions, which often conflict with true market competition.
- There is generally a lack of institutions and experience for electricity-industry regulation among all countries in Northeast Asia.
- Related to the above, there is a shortage of legal, judicial, and professional support for electricity industry restructuring.

It is important to note that, in spite of the successes in many countries in Northeast Asia with respect to telecommunications and natural-gas-industry restructuring, the electricity industry is fundamentally different for the following reasons:

- Electricity cannot be stored, thus system control is critical yet complex.
- Demand elasticity is small, thus reliability requirement and price volatility are large.

Given these unique conditions, Northeast Asian economies need a carefully planned and developed electricity industry restructuring process. To be effective, the process should include the following elements:

- Revise the electricity laws for long-term vision and general policies, not for detailed procedures.
- Establish an independent, high-caliber regulatory commission.
- Explore incentive regulation as a transition step.
- Develop a restructuring blueprint based on careful evaluation of market structure options, through the use of proven system simulation models.
- Conduct pilot projects on consumer choice, product unbundling, and energy diversity to gain experience.
- Develop cooperation among leading utilities to exchange experience and ideas.