URGENT NEED TO RESTRUCTURE JAPAN'S ELECTRIC POWER INDUSTRY AFTER FUKUSHIMA

Austrian economist Joseph Schumpeter argued that the "process of creative destruction," whereby new industries are created by destroying the old combinations and creating new ones, is essential to drive growth. Japan's electric power industry finds itself at such an evolutionary crossroads.

The Fukushima nuclear disaster offers Japan a chance to pull the plug on the nation's power monopolies and put in place an energy industry that would be more efficient, innovative, environmentally friendly, and safer.

Tokyo Electric Power Company (TEPCO), which owns the Fukushima power plants, is a typical Japanese power monopoly. It supplies electricity to the Tokyo metropolitan area and can flex enormous market muscle as an integrated regional monopoly in the supply of electric power.

It is able to shift its costs to regulated tariffs, resulting in electricity prices in Japan that are 50% higher than those in the US. TEPCO's priority has been to secure its place as a regional monopolist and gain monopoly profits. The cozy nuclear power ties between regulators and the regulated, such as TEPCO, have entrenched both in a self-promoting "nuclear-industrial complex."

There is a better way. And that is to adopt a modular industrial structure for the Japanese electric power industry by splitting the integrated regional monopolies into separate corporate entities based on their functions: resource acquisition, generation, transmission, and retail distribution.

The remarkable speed of innovation in the global information and communications industries has largely taken place through modular industrial organizations. If power suppliers and customers are competitively linked through an electric and information transmission grid, there will be high-powered incentives for energy conservation, exploitation of alternative energy sources, and more efficient power storage. The players in this market may come from companies outside the traditional electric power industry, such as IT companies, makers of plug-in cars, architectural design and construction firms, and battery and electric equipment manufacturers.

A modular structure would spur innovation and be environment-friendly. Nuclear, thermal, hydro, solar, wind, geothermal, and other power sources could be connected as mutually autonomous modules (independent corporate entities) and compete for investor attention.

The system could then self-organize its innovation through evolutionary selection from among those modules rather than through advanced planning by a corporate headquarters. Such modular competition in innovation would create option values not possible under a hierarchical corporate control of innovation.

Modular competition has favorable incentive impacts on each module not available under the integrated corporate system, because the extra innovative effort increases the marginal probability of finding the best technology.

As a start, the Japanese government could buy TEPCO's transmission grid and place it under a new corporate entity acting as an independent system operator (ISO). As in many European countries, Japan could create a publicly-owned, equal-access transmission system. Public ownership would be based on the assumption that the transmission grid is a natural monopoly, but generation is not. The ISO could ensure that potential electric power suppliers, as well as retailers and large corporate customers-cum-independent-generators, have equal access under rules that the ISO sets and implements.

Generators of various types (possibly including existing nuclear plants that have passed stress tests), as well as regional retail suppliers, could also be independently incorporated. Supply and demand may be matched through an ISO-run spot market where electricity would be sold for cash and delivered immediately. To provide incentives for investment in power generation and restrain possible price volatility, spot markets could be supplemented by the following three measures.

First, retail distributors and large consumers could engage in long-term, fixed-cost hedging contracts with suppliers to restrain the potential exercise of "short-term" market power by suppliers. If only spot markets are used, suppliers may be able to create monopoly power by creating artificial supply shortages deliberately shutting down their plants for unscheduled maintenance.

Second, personal consumers could contract for power supply for a specified quantity limit under a fixed price, and pay a spot market price (e.g., a day ahead price) beyond the limit, while rolling over unused quantities, as already happens in the cell phone industry. Such dynamic pricing mechanisms could be supported by the introduction of internet-friendly smart meters. Such initiatives would motivate consumers to respond to changing supply conditions.

Third, given these positions, competition in electricity supply could be accomplished by introducing "cost-based dispatch."

In a market with cost-based dispatch, modular generating companies submit their start-up, no-load, and variable costs, or supply schedules contingent on spot market prices, to the ISO. The ISO then requests power per hour from the generating companies' assets to minimize cost and maximize reliability in meeting electricity demand. The ISO thus facilitates the way to trade energy in the spot market based on marginal cost of generators. Consequently, generators compete based on their cost of production. The clearing price in the spot market is equal to the cost of production of the last generating unit dispatched. Given the state of information and communication technology, the operation of such smart grids is feasible in Japan.

Source: http://www.asiapathways-adbi.org/2012/01/urgent-need-to-restructure-japans-electric-power-industry-after-fukushima/