

AVOIDING PITFALLS IN CHINA'S ELECTRICITY REFORMS

Michael Davidson, Massachusetts Institute of Technology, Phone +1 (617) 253-7492, E-mail: michd@mit.edu

Ignacio Pérez-Arriaga, Massachusetts Institute of Technology, E-mail: ipa@mit.edu

Overview

In March 2015, China's State Council inaugurated a new round of electricity reforms with the goals of enhancing competition, increasing efficiency, reducing electricity prices, and integrating renewable energy. Specifically, plans focus on implementing cost-of-service network tariffs, increasing out-of-plan market-based generation pricing, and opening up retail competition. In contrast to 2002 reforms, the current effort is seen to be more pragmatic and likely to succeed in modifying current practices, building on a decade of experiences post-unbundling in China. However, based on published documents and experiences to date with likely reform implementations, several potential pitfalls can stand in the way of achieving the reforms' ultimate goals.

Methods

We isolate four main themes that have been demonstrated in numerous international contexts to be potentially problematic. For each, we first highlight the theoretical causes for concern, grounded in basic principles of regulatory economics. Next, we highlight international cases of these pitfalls leading to disruptions in reforms as well as solutions to address them. We close each section with insights into the current status of relevant reforms in China, based on in-country interviews conducted in 2015-2016 and a review of the literature. The paper concludes with recommendations drawn from these international experiences tailored for China, which we feel are both feasible and crucial.

Results

Pitfall #1: Reliance on physical contracts tied to electricity delivery instead of more flexible financial contracts. Efficiencies improve in electricity markets as they incorporate greater detail in changing conditions of network, demand and supply. Financial contracts—where actual dispatch is not tied to market transactions—give the system operator greater ability to determine efficient dispatch schedules given full knowledge of network conditions. Inflexibilities of physical contracts have caused numerous headaches, e.g., in the Southern African Power Pool. Physical contracts may be warranted in some cases of generation scarcity.

Pitfall #2: Emphasis on long-term contracts before a sufficient short-term market is in place. In order for financial contracts to be priced efficiently, participants need reference prices for the underlying commodity, which for electricity must, at minimum, reflect the short-term variations in network conditions and marginal cost of supply. Long-term financial contracts can provide benefits in terms of risk reduction and price stability. If physical contracts predominate, inefficient physical dispatch from out-of-merit-order dispatch can occur. The UK market, with high percentage of bilateral contracts, has had to develop complicated imbalance markets and mechanisms to ensure efficiency and system balance.

Pitfall #3: Retail pricing reforms not based on reference energy prices. Efficient retail electricity rates should be based on the whole market price for energy to ensure efficient consumption and appropriate locational signals. As discussed previously, this is impossible without an accurate generation price reference, which comes from a short-term spot market. If subsidization is implemented (for poverty alleviation or other political goals), then the least distortive method, as implemented in Spain, is to subsidize the fixed network and regulated costs while allowing energy prices to pass through. If government default retail prices are set too low without appropriate measures, retailers may refuse to purchase energy during some hours, leading to undersupply, e.g., observed in India.

Pitfall #4: Failing to address conflicts of interest in system operation. Well-functioning wholesale electricity markets require non-discriminatory system operation free of considerations beyond efficiency and grid reliability. Direct political intervention—e.g. quotas for certain generation—and indirect conflicts of interest such as a system

operator having a financial interest in certain transactions, are to be avoided. Two international models—US-style independent system operators (ISOs) and EU-style transmission system operators (TSOs)—represent viable structures.

Conclusions

Based on numerous international experiences with electricity sector restructuring, China needs to be careful to properly incentivize flexibility in order to increase efficiency and accommodate increasing renewable penetration. In other systems, short-term markets and financial instruments have played important roles. In the absence of these China may resort to more mandates, creating a complicated set of priorities for generation and grid companies, and making it difficult to achieve efficient system outcomes. Retail competition can help increase efficiency in some limited cases, but benefits will be dependent on how open the generation market is.

Historically, responsible authorities have had difficulty independently regulating the sector. Hence, better oversight of grid companies and other government agencies—in both planning and operation—will be essential to achieve big gains. Current arrangements do not give sufficient focus to creating non-discriminatory markets that cross provincial borders, and eliminating various conflicts of interest, particularly in dispatch.

Finally, transition mechanisms and transition costs need to be openly discussed. All reforms will create winners and losers, and managing these interest conflicts will be critical for sustaining reforms throughout the restructuring process. Arrangements made under previous regulation should be honored or appropriately compensated to the extent possible.

References