DEMAND-SIDE MANAGEMENT IN CHINA – COMMITMENT TO A LITTLE BIT COULD GO A LONG WAY

Issue Brief

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INTRODUCTION

On January 1, 2011, China’s national demand-side management\(^1\) (DSM) regulations went into effect, after an announcement by the central government that coincided with the UN climate negotiations in Cancun, Mexico. The regulations call for power grid companies to achieve electricity savings using DSM amounting to at least 0.3 percent in sales volume and 0.3 percent in maximum load compared with their previous year.\(^2\) In 2009, China’s net electricity generation topped 3,446 billion kilowatt-hours\(^3\) and is expected to triple in the coming 25 years.

The significance of this DSM program is that it may usher in a new set of tools, approaches, and programs for energy management to incentivize energy efficiency in buildings and the industrial sector – and as a result delay the construction of some coal-fired power plants. Implementation of these goals will vary by region or province. Provincial power authorities will have the authority to set the target for local grid companies. To support implementation, a DSM fund will be created from differentiated pricing, government budget allocation, and construction fees. This fund will be used for a variety of types of projects including:

- Creation, operation, and maintenance of new load-control systems
- Development of pilot projects
- Provision of rebates
- Support for training, education, and program evaluation.\(^4\)

Because of the breadth of the rule, the National Development and Reform Commission (NDRC) will lead the implementation, with advisory support from the Ministry of Finance, the State Electricity Regulatory Commission (SERC), and the State-owned Assets Supervision and Administration Commission (SASAC). In May 2009, the NDRC approved publication of the Chinese DSM Program Procedures Manual, which provides a framework for industrial DSM administration and implementation in China.\(^5\)

Importantly, beyond the specific targets, the regulations also require power companies to change their planning approach. The new regulations require conservation as a first strategy in “capacity planning,” which projects how electricity systems will meet future energy needs. In China, as in many countries, capacity planning often has been dominated by supply-side discussion. Integrating demand–side planning into the discussion can mitigate the need for additional electricity generation – thereby avoiding construction of some new coal plants. Approximately 30 GW of coal-fired power plants were under construction in China in 2010 (Figure 1).\(^6\)

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\(^1\) Demand side management is “a mechanism in which a utility or some other state-designated entity uses funds derived from the electrical system to promote energy efficiency through targeted educational or incentive programs whose effects are measured quantitatively.” Finamore, B., Zhanggang, H., Weisheng, L., Tiun, L., Yande, D., Fuqiu, Z., Zhong, Y. “Demand-Side Management in China: Benefits, Barriers, and Policy Recommendations.” October 2003.


\(^4\) Shen, B. Personal interview held on March 26, 2011.


A study from the China Sustainable Energy Program (Figure 2) found that there was nationwide potential for avoidance of more than 400 billion kWh from DSM programs in 2010.\(^7\) The DSM rule means that more than 100 million kWh of electricity generation will be avoided annually in China, beginning in 2011. Acceleration to close the gap will depend on five key factors:

**Figure 1.** Coal-fired capacity plans in China and in the United States.

**Figure 2: Potential for DSM savings in Chinese cities.**

1. **Proven success in pilot programs:** Different cities and provinces in China have initiated DSM efforts in the past. In the late 1990s, the city of Beijing focused on DSM for peak-load management, eliminating $3 million in annual costs for peak load power plant capacity expansion. Hebei province has enacted similar measures featuring time-of-use pricing and interruptible tariffs for industrial customers and is also implementing a 600 MW Efficiency Power Plant (EPP) to enable long-term efficiency reductions. Jiangsu province used a partnership with the State of California to build a large-scale industrial EPP program that has saved more than 2 billion kWh of electricity annually. These pilot programs have been largely successful, and the demonstration of further success in DSM – and the aggregation of best practices to achieve success – will smooth the path to greater efficiency in China.

2. **Changing mindsets and the definition of progress:** In economics, expansion rather than contraction is seen as progress. For a developing country like China, building new power plants is a sure sign of a burgeoning economy that demands additional power to meet growing needs. However, reducing energy demand is more economically efficient than building additional power plants: the weighted average cost of an “energy efficiency power plant” (15 fen/kWh) is approximately one-third the cost of a conventional plant (35-40 fen/kWh).

3. **Sector integration:** Although the largest component of China’s electricity use comes from the industrial sector, end-use consumption in the residential sector is growing: in 1980, China’s residential electricity consumption totaled 10.52 TWh (terawatt-hours). In 2006, that had grown to more than 325 TWh. In the same time period, electricity consumption from commercial buildings grew 50-fold. Managing these growing sources of demand will be imperative to engaging Chinese citizens to meet the central government’s intensity goals in the twelfth Five Year Plan.

4. **Pricing reform:** Electricity pricing in China is notoriously low. Although time-of-use pricing and other peak-pricing mechanisms are in place, their long-term effectiveness is limited, since the demand curve shape is rather smooth compared to geographies with less industrial around-the-clock demand. Electricity prices that reflect the true cost of generation would trigger energy efficiency investment, curb consumption, give incentives to demand management, and allow the central government to pull back from providing financial bailouts to utilities when their costs tremendously exceed their revenues. A proposal for tiered pricing in the residential sector, based on consumption, is currently under review. This may reveal an emerging shift for the commercial and industrial sectors in the future, but the current proposal is only for residential pricing. Further, revenue decoupling – another mechanism for encouraging energy efficiency and DSM techniques – has not occurred in China.

5. **Shifting perceptions of DSM away from load management and toward efficiency:** China’s experience with DSM-like projects has previously favored utility-driven load management over true energy efficiency. Many Chinese load management programs were initated at the turn of the century as China was rushing to meet accelerated demand without enough time to build additional capacity. For lasting change to take place, integrated resource planning will need to focus not on short-term needs like avoidance of temporary blackouts but on more long-term objectives. Additionally, for real success, this planning will need to focus on end-use efficiency, even as it reduces consumer electricity use.
Since the announcement of the new DSM rule, two working groups have been formed with a mandate to study the regulation from two angles:

- Building strong capability to identify front-end opportunities for power providers to develop DSM programming
- Measuring and evaluating the performance of those programs through means such as audits and rigorous measurement and verification.

Recommendations from these groups are expected in the summer of 2011, and details about investment actions that satisfy the rule will follow.

Demand-side management techniques that include energy efficiency are imperative to curbing China’s burgeoning appetite for electricity. The new DSM regulation from China’s central government provides an opportunity for provincial authorities to create innovative tools and programs that approach meeting that appetite through a combination of supply and demand solutions.

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\[18\] Shen, B. Personal interview held on March 3, 2011.
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