

China Electric Utilities Program Strategy

Overarching goal: To encourage a shift in investments in China's power sector away from fossil fuel-based electricity generation and toward energy efficiency and renewable energy.

Goal #1: Encourage China to adopt policies that maximize energy efficiency and renewable energy in the power sector.

Means:

1. Assist with developing national-level policies that will maximize "negawatts" of energy savings and new megawatts of renewable energy (such as public benefits charges, renewable portfolio standards, tax incentives, distributed generation policy mechanisms, Integrated Resource Planning principles, etc.)
2. Encourage at least two provinces to develop and implement energy efficiency and renewable energy policy pilots to serve as national examples.
3. Encourage Integrated Resource Planning principles for siting and developing new generation resources so as to inject least-cost planning principles into competitive generation markets.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on the ability to deliver measurable progress in the form of key performance indicators. Overall progress includes these metrics.

1. The extent to which energy efficiency and renewable energy policies are adopted and implemented effectively by the central government.
2. The extent to which two or more target provinces adopt and implement energy efficiency and renewable energy policies.
3. The volume of energy savings and renewable energy deployed as a direct result of these policies, leading to measurable carbon emissions reductions.

Goal #2: Encourage a shift in China's generation investments away from coal-fired power plants and toward cleaner generation, particularly demand-side energy savings, by emphasizing strong air emissions and energy efficiency regulations for power plants.

Means:

1. Encourage central government policy-makers to adopt output-based "generation performance standards" (GPS) for power plants.
2. Encourage at least two provinces to adopt GPS implementation pilot programs.

Evaluative Criteria (Key Performance Indicators):

We support and evaluate projects based on the ability to deliver measurable progress in the form of key performance indicators. Overall progress includes these metrics.

1. The extent to which the central government adopts and implements air emissions and energy efficiency policies for power plants. (GPS of 4.3g SO₂/kWh by 2010 and 3.2g SO₂/kWh by 2020).
2. The extent to which provinces demonstrate the GPS approach.
3. Volume of investment into cleaner generation and demand-side energy savings as a direct result of these policies.

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Electric Utilities

Goal #1: Encourage China to adopt policies that maximize energy efficiency and renewable energy in the power sector.

Power Sector Regulatory Reform: Encouraging National, Regional, and Provincial Regulatory Bodies

China's electricity sector has been under the authority of a single, large state-owned enterprise, the State Power Corporation. Ongoing regulatory reforms aim to break up SPC's monopoly control over generation, and break the company into regional transmission and local distribution companies. Grantees are working to help facilitate this process with the goal of tapping electric utility revenues to deliver public benefits, including energy efficiency and renewable energy.

The Institute of Economic System and Management (IESM), which was affiliated with the former State Council Office for Restructuring the Economic System (SCORES) and is now under the National Development and Reform Commission (NDRC), coordinated a multi-ministerial project to design and recommend an independent regulatory body to oversee national regulatory reforms and to coordinate policies to maximize the public benefits of sector reforms, particularly stimulating utility investment in energy efficiency and renewable energy. Based on IESM's report, the State Council issued a decree in March 2003 establishing China's new State Electricity Regulatory Commission (SERC).

Since then, per SERC's request, grantees have provided support for SERC's capacity building. The Regulatory Assistance Project (RAP) has provided full-time assistance to IESM and has assisted SERC's capacity building, particularly personnel and regulatory training. So far, SERC has established six regional and a number of provincial offices, with a total of around 1,000 staff. IESM's work in 2005 will focus on assisting SERC to formulate regulations that encourage clean generation and demand-side management, and will help develop institutional capacity for the regional regulatory agencies.

Recommendation: The market rules and decisions made by China's regulatory bodies should influence utilities' environmental performance and encourage public benefits. More revenues pass through electric utilities than any other business, and electricity is fundamentally infused with the public interest. Policy-makers should:

- Require 2 percent of all utility revenues to be dedicated to solving the health and environmental problems caused by fossil-based electricity.
- Require regulatory bodies to fully consider, when executing power regulation, the environmental impacts of the electric utility sector.
- Require utilities to diversify their generation resources to include renewable energy.
- Require utilities to invest in energy saving end-use technologies whenever it is cheaper than building new supply, and provide utilities with an equal or greater return on investing in efficiency than in new supply.

Demand-Side Management (DSM) Policy Analysis

China's leadership has expressed strong interest in energy efficiency as a means toward meeting the country's escalating power demand. Yet China's DSM progress to date has largely focused on load management (shifting demand to off-peak) rather than energy efficiency (investment in technology that uses less energy). The State Power Economic Research Center (SPERC) and the Beijing Energy Efficiency Center (BECon) have worked with international DSM experts from the Natural Resources Defense Council (NRDC) and RAP to tackle implementation barriers to utility-financed DSM programs. However, strong barriers to energy efficiency investment still exist in China, particularly the lack of mechanisms for funding efficiency programs through electricity rates. SPERC, BECon, NRDC, and RAP continue to assist central government policy decision-makers to deepen their understanding of DSM and its strategic importance in improving energy efficiency and building a well-off society.

With the assistance of SPERC, BECon, NRDC, and RAP, local pilot programs in Jiangsu, Shanghai, and Guangzhou are generating significant electricity savings. For example, since 2002, Jiangsu provincial authorities have provided over 140 million RMB (US \$17 million) to support DSM and have leveraged more than 900 million RMB (US \$110 million) in private investment from enterprises. Altogether, more than 180 DSM projects have been implemented in Jiangsu, resulting in electricity savings of more than 700 million kilowatt-hours (kWh) annually.

With joint funding from the Asian Development Bank (ADB), the international and Chinese experts have developed an Energy Efficiency Power Plant (EPP) concept in Jiangsu and Shanghai. An EPP is a bundled set of energy efficiency programs designed to deliver the energy and capacity equivalent of a large conventional power plant. By implementing EPPs, Jiangsu and Shanghai could cut peak electricity demand by over 600 megawatts (MW) each at only a quarter of the cost of building new power plants. ADB has proposed to finance the development of the EPPs. Grantees are working with NDRC, local authorities, and the utilities to perform in-depth analysis and implementation arrangements.

Recommendations:

- China should institutionalize demand-side energy efficiency as a fundamental element of the sustainable development of the electricity sector. All electricity regulatory commissions at the national, regional, and provincial levels should insure that utilities develop and dispatch the least-cost energy resources, on an "all-in" social costs basis, first. The regulatory commissions should require every utility in China to execute DSM programs.
- China should reform its tariff structures so that utilities recoup their investment in demand-side energy savings technologies. SERC should adopt a revenue cap approach to eliminate potential conflicts of interest for utilities when implementing DSM projects.
- Establish a national fund that matches, dollar-for-dollar, special provincial funds to finance DSM projects.
- NDRC should give local authorities a clear signal to move forward with the Energy Efficiency Power Plant projects. EPPs should be replicated nationally.

Goal #2: Encourage a shift in China's generation investments away from coal-fired power plants and toward cleaner generation, and particularly demand-side energy savings, by emphasizing strong air emissions and energy efficiency regulations for power plants.

Generation Performance Standards

Generation performance standards cap power plant emissions on an electricity production basis, thereby encouraging energy efficiency and cleaner generation. Through two years of efforts, CRAES and local grantees have made GPS a well-accepted concept in China. The Chinese Research Academy of Environmental Sciences (CRAES), under the guidance of SEPA and in cooperation with local Environmental Protection Bureaus (EPBs), conducted local generation performance standards (GPS) pilots in Zhejiang, Shandong, Shanxi, and Jiangsu provinces during 2002-03. In 2004, building on previous achievements, CRAES developed the framework for a GPS-based sulfur dioxide emissions allocation program as well as designed a GPS policy and regulatory framework that emphasizes adequate monitoring and enforcement.

CRAES is currently (1) working with SEPA to build a total emissions control mechanism based on GPS aimed at limiting thermal power plant emissions for the 11th Five-year Plan; (2) designing an emissions trading program based on GPS and conducting provincial-level emissions trading pilots; and (3) developing certification, monitoring, and enforcement procedures and training programs for provincial officials.

Recommendation: SEPA should expedite the incorporation of a GPS-based emissions standard and allowance allocation mechanism into the national total emissions control target and develop necessary regulations for enforcement.

Internalizing Environmental Costs into China's Electricity Tariffs

China's power tariffs have two main drawbacks. First, they do not take into account the environmental and public health externalities caused by fossil fuel-fired power generation. Second, rate designs typically provide a disincentive for utilities to pursue demand-side management (DSM) and other energy saving programs. The Chinese Research Academy of Environmental Sciences (CRAES) developed several options for internalizing environmental costs into electricity tariffs, including management methods, and submitted its findings and policy recommendations to SEPA, NDRC, and SERC. The report is an important reference for NDRC and SEPA in designing a new tariff mechanism that will help utilities recoup the costs of investing in demand-side energy saving technologies.

Building on previous efforts, the Institute of Economic Research of NDRC and CRAES are designing a power tariff mechanism that levels the competitive playing field for clean power generation and end-use efficiency. The project team made recommendations to NDRC on providing pricing incentives to coal-fired power plants fitted with sulfur scrubbers and on discriminative pricing options to inefficient industries. These recommendations have been adopted in the latest *Implementation Methods on Power Tariff Reform* by NDRC.

Recommendation:

- China should develop and implement pricing mechanisms that fully internalize environmental costs into electricity tariffs in order to create a level competitive playing field for clean energy sources, including energy efficiency and renewable energy.
- Design the new tariff in coordination with pollution levies and other environmental policies.

Natural Gas Power Generation Regulations and Incentive Policies

In an effort to reduce environmental pollution and diversify the mix of power generation, the Chinese government is developing and implementing regulations and incentive policies that increase the market share of natural gas power generation. Since environmental externalities have not yet been fully incorporated into China's power tariffs, natural gas power plants are uncompetitive vis-à-vis conventional coal-fired plants. NDRC and SERC are actively seeking policy and regulatory interventions that could catalyze strong natural gas demand. Their goal is to make gas more competitive than coal in China's electricity markets.

A team of experts from the Energy Research Institute (ERI) and State Power Economic Research Center (SPERC) are: (1) reviewing international experiences in gas market development and power generation; (2) assessing the efficient use of natural gas and the role of power generation in natural gas market development; (3) conducting analyses of environmental externalities and pricing options for natural gas power generation in the context of competitive power markets; and (4) developing investment and market entry policies and regulatory options for natural gas power generation.

Recommendation: Fully internalize environmental costs into power tariffs. Implement regulations and incentive policies that level the competitive playing-field for natural gas power generation.