

## China Buildings Program Strategy

**Overarching goal: To promote building energy efficiency through appliance energy efficiency standards and building codes.**

**Goal #1: Reduce energy consumption from household appliances and equipment through standards and labels.**

Means:

1. Assist with training government research institutions and advocates in appliance standards analysis;
2. Provide assistance so that China can develop and adopt a mandatory standard for one or more new appliance each year, per China's plans.
3. Assist in the development of energy labels.

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 amount of energy and carbon saved through the adoption and implementation of appliance standards.
2. Whether one new national appliance standard is adopted annually, including a supporting labeling regime.
3. Whether manufacturers implement the standards effectively.
4. Whether a regular process of standards updates ("reach standards") becomes institutionalized at the national level.

**Goal #2: Develop residential and commercial building energy codes in Central and South China, and develop policies that effectively implement those codes.**

Means:

1. Help build Chinese institutional capacity including technical skills in energy analysis, standards development, energy-efficient design and operations, and policy formulation.
2. Help the Ministry of Construction (MOC) and local authorities in the central and southern climate zones to implement codes effectively.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on the ability to deliver measurable progress, including:

1. The amount of energy savings and carbon avoided due to adoption and implementation of new building codes in China.
2. Whether major cities in the central and southern climate zones adopt and effectively implement new codes.
3. The volume of floor space built to the new codes. Fifty percent of new buildings in major cities in the central and southern climate zones should meet the new codes in 2010.
4. Whether MOC adopts and effectively enforces new mandatory implementation policies nationally.
5. Whether new analytic capacity is transferred to appropriate institutions, which in turn leads to future code development.



**China Sustainable Energy Program**  
**PROJECT UPDATES**  
**June 2005**

## **Buildings**

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*Goal #1: Reduce energy consumption from appliances and equipment through standards and labels.*

### **Appliance Energy Efficiency Standards**

To date, grantees have supported the development of six mandatory energy efficiency standards: refrigerators, air conditioners, fluorescent lamps, clothes washers, TV sets, and gas appliances (Chongqing). Energy savings from these standards will reach about 300 million tons of coal equivalent and reduce 200 million tons of carbon cumulatively through 2020.

Grantees have also encouraged a more modern approach to setting appliance efficiency standards, based on the “reach” standards concept. China’s traditional approach to developing energy efficiency standards was to: (1) set easy-to-meet conventional standards intended to eliminate the least efficient 15 percent of products currently on the market; and (2) enforce those standards within six months of being issued. If China is to encourage a “leapfrog” to the most efficient appliances, it must adopt mandatory “reach” standards, that is, standards that “reach” for efficiencies of the most advanced products on the market. Grantees have developed reach standards for refrigerators, air conditioners, fluorescent lamps, and TVs. All have been approved (although TVs are still pending).

Currently, two new standards are under development—one for power supplies, and the other for natural gas water heaters. “Power supplies” are the nearly universal “wall plugs” that convert high voltage alternating current (AC) into low voltage direct current (DC) for use by electronic components. China produces 80 percent of the world’s power supplies and is one of the world’s largest users. The China Certification Center for Energy Conservation Products (CECP), with international assistance from the Natural Resources Defense Council (NRDC) and Ecos Consulting, are conducting market surveys, establishing testing procedures, and developing mandatory minimum energy performance standards for power supplies both in active and standby modes.

China's natural gas water heater sales have doubled since 1990, reaching eight million units in 2002. As China embarks on expanding gas pipeline networks nationally, gas appliance sales are exploding. This project is building on Chongqing’s recently adopted gas water heater standard, and aims to replicate it nationally.

### **Appliance Energy Efficiency Labels**

Endorsement and information labels, when affixed to energy-efficient appliances, can promote consumer purchases of the most efficient products. China’s voluntary endorsement label program is piloting a standby power label. Standby power is the electricity used to power memory and remote control settings while appliances are “off.” In China, standby power

leakage is at least three times more than in the U.S., and may comprise as much as 10 percent of all residential electricity use. In 2003, China developed standby power endorsement labels for five products: DVDs, copiers, printers, fax machines, and power supplies. With grantee assistance, the national endorsement label for the first product—TVs—was adopted in April 2002.

CSEP grantees are also assisting China to develop mandatory energy information labels. Information labels help consumers compare the efficiency and lifecycle energy costs of a wide range of consumer appliances and equipment. The National Development and Reform Commission (NDRC) issued the *Regulation of Mandatory Information Label* in September 2004. A nationwide mandatory information label program was kicked off in March 2005 with refrigerators and air conditioners as the pilot products. Manufacturers will be required to affix the labels to all products. This will require manufacturers to incorporate public responsibility—energy impacts of their products—for public view and assessment prior to purchase.

### **Set-top Box Labels**

Set-top boxes (STBs), known as Digital Television Adapters, convert digital signals to analog signals for existing TV sets. The market for STBs is on the verge of taking off in China. A complex STB, which includes a variety of functions such as recording, interactive programming, and decoding of encrypted signals, can waste up to 25W in standby mode. By 2015, 300 million households will be converted to digital cable. Improving the efficiency of STBs by 20 percent could save four million tons of carbon emissions in 2015 and obviate the need for two large (1,000-MW) coal-fired power plants.

Starting in March 2005, CECP, Lawrence Berkeley National Lab (LBNL), and NDRC have been working on developing STB efficiency standards and a consumer label. Since STBs are just being rolled out across the world in response to digital televisions, grantees will coordinate with global program activities to harmonize STB standards with the U.S., Europe, and Japan. Results are due in 2006.

### **Monitoring and Enforcement of Energy-Efficiency Standards**

China's latest "reach" standard for room air-conditioners alone could reduce the nation's peak electricity demand by 7,000 megawatts in 2020 (14 large, 500-MW power plants). However, comprehensive monitoring and enforcement mechanisms are needed to ensure that all manufacturers produce and sell only AC units that fully comply with the standards.

**The China National Institute of Standardization (CNIS) and LBNL are helping China to develop monitoring and enforcement mechanisms to implement energy-efficiency standards in China.** The team is: (1) analyzing international monitoring and enforcement experiences and China's implementation challenges, (2) developing a monitoring and enforcement framework for China and specific implementation guidelines, (3) setting up an "elimination system" for high energy consuming products, and penalties to be administered by NDRC and the Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ), (4) developing a list of key appliances to be included in China's annual quality inspection regime at the national and local levels, (5) establishing a comprehensive monitoring system with the participation of industry associations, manufacturers, and related organizations, and (7) creating

a professional registry and energy efficiency information system to publicize energy efficiency information.

### **Evaluation of Mandatory Energy Efficiency Labels Implementation**

China formally launched its mandatory energy efficiency label program on March 1, 2005. Room air conditioners and household refrigerators are now required to bear efficiency labels. Vice Premier Zeng Peiyan recently commended the labeling program for its role in promoting the production and use of energy-efficient products. The China National Institute of Standardization (CNIS) is now evaluating the implementation of the labeling program. This work will provide the impetus for extending the labeling program to other home appliances, lighting products, and industrial equipment.

The project team is (1) identifying barriers to labeling implementation, (2) providing recommendations for improving the administrative monitoring of the labeling program, (3) testing samples in the market to check for accuracy in labeling, (4) drafting a report and disseminating their findings to the media. CNIS is also training local supervision authorities and energy conservation centers on monitoring.

#### **Recommendations:**

- The Chinese government needs to establish an effective implementation mechanism for appliance efficiency standards and labels with penalties for non-compliance.
- Expanded government budgets, in addition to supporting more comprehensive and more rapid appliance standards, should go toward hiring and training new monitoring, inspection, and verification personnel. Enforcement teams are needed to inspect appliance factories and verify that appliance retail outlets only sell appliances that comply with the latest, most efficient standards and labels.

### **Research on Implementation of Mandatory Lighting Equipment Efficiency Standards**

Lighting represents one of the largest uses of electricity in China. Improvements in lighting technology could provide significant energy savings. While China has mandatory energy efficiency standards in place, it lacks effective implementation and enforcement. The number of products on the market that comply is unknown and no penalties exist for non-compliance. Grantees the American Council for an Energy-Efficient Economy (ACEEE) and Beijing Electric Light Source Research Institute (BELSRI) are surveying the compliance rate of energy-efficient lighting standards.

ACEEE and BELSRI are (1) identifying the barriers to standards enforcement, (2) testing products from different regions for standards compliance, (3) reporting results and disseminating findings via the media and workshops, and (4) providing recommendations to government agencies for enhancing standards compliance and upgrading the existing lighting standards.

### **Tax and Fiscal Policies for Promoting Energy Efficient Products**

Home appliances in China are less efficient than those in industrialized countries. Higher prices impede the commercialization of the most energy efficient appliances and equipment. National

incentive policies are needed to remove these market barriers. The Regional Finance Research Division (RIFS) of the Research Institute for Fiscal Science (under the Ministry of Finance) and CNIS are designing tax and fiscal policies to encourage commercialization of efficient appliances and equipment. RIFS and CNIS are (1) researching international incentive policies, (2) studying the effectiveness of tax and fiscal policy tools, (3) prioritizing products for fiscal policy support, and (4) developing policy recommendations and an implementation plan.

**Recommendation:** NDRC and MOF need to move faster to develop national tax and fiscal policies to promote energy efficient products.

### **Shanghai Reach Standards**

China is the world's largest manufacturer of appliances and consumer electronics. There is a huge backlog of standards that need to be developed. But to date, the central government has failed to allocate sufficient funding to step up the pace of standards development and implementation. China needs its major cities to lead to quicken the pace of standards development. Shanghai has taken the lead and already adopted "reach" standards ahead of the national schedule. Launched in March 2004, this project supports the Shanghai Energy Conservation Supervision Center (SECSC) and LBNL to develop a "carrot and stick" reach implementation approach for Shanghai. The project team is developing best options for implementing stringent appliance standards in Shanghai and is garnering policymaker support.

**Recommendation:** Shanghai's municipal government needs to establish an action plan to develop and implement aggressive appliance and equipment standards—ahead of national standards—for the most energy-consumptive appliances sold within its jurisdiction. This will help Shanghai shave peak electricity demand and cope with power shortages while positioning the city as a sustainable development leader.

***Goal #2: Develop residential and commercial building energy codes in China's central and southern climate zones and develop policies that effectively implement those codes.***

### **Residential Building Codes Implementation in the Hot-Summer Cold-Winter (Central China) Climate Zone**

Grantees successfully developed state-of-the-art residential and commercial building codes, which have been adopted at the national level. Without effective implementation, however, the codes will have little impact on the building industry. Grantees are focusing on two pilot cities, Shanghai and Chongqing, to develop model implementation and enforcement approaches that can be replicated throughout the HSCW area. The two pilot cities will establish (1) a labeling program that certifies if a building meets or exceeds the energy code, which can be used to help developers market their buildings, and (2) incentive policies that comply with and facilitate national incentive policies.

## **Residential Building Code Implementation in Hot-Summer Warm-Winter (Southern China) Climate Zone**

By the end of 2003, the Ministry of Construction (MOC) had issued a new residential building code for the Hot-Summer Warm-Winter (HSWW; South China) climate zone. If broadly and effectively implemented, this code could cut energy use by 50 percent in households and eliminate 11 large (500-MW) power plants within 10 years. Yet without vigorous implementation, the code will have little impact on the building industry. Beginning in June 2004, this project is supporting HSWW code implementation through both “top-down” and “bottom-up” approaches.

At the local level, grantees are helping MOC to implement the new code in Guangzhou, Shenzhen, Fuzhou, and Xiamen. They are developing 3-to-5 year implementation plans, creating design software, establishing a labeling program for the most energy efficient buildings, and creating local implementation regulations and policies. In addition, the four cities are (1) strengthening the monitoring and supervision of residential building construction for energy code compliance, (2) disseminating lessons learned in the pilot program to other cities within the region, and (3) developing policies to implement the national commercial building code issued in April 2005 as well.

At the central government level, MOC is developing a *National Provision for Building Energy Efficiency* that it intends to submit for State Council approval, in order to require local compliance with energy codes nationally. Grantees are helping MOC to develop a national regulatory framework, including provisions for monitoring, verifying, and enforcing the efficient design, construction, and operation of energy efficient buildings. MOC is working with local cities not only in the HSWW area, but also in northern and central China, to incorporate local best practice monitoring and enforcement approaches into national policies.

## **Local Commercial Building Code Implementation**

Shanghai is piloting implementation of a state-of-the-art commercial building code. Shanghai Tongji University (STU) in cooperation with LBNL formulated a commercial building code that could reduce energy consumption by 50 percent. The Shanghai municipal government issued the code in October 2003; it became effective in January 2004. STU developed software for Shanghai’s codes implementation and is training decision-makers, designers, and developers on its use. STU is also training professional inspectors in Shanghai to facilitate and monitor code implementation and compliance.

## **National Commercial Building Energy Code Implementation**

The Shanghai pilot commercial code project sparked the Ministry of Construction’s (MOC)’s drive to develop and implement a national commercial building code. The China Building Energy Efficiency Association, China Academy of Building Research, and LBNL helped MOC draft a national commercial building code. The code was approved by MOC in April 2005 and will take effect on July 1, 2005. CSEP intends to support several pilot cities to implement and enforce the national code, in order to develop implementation models for national replication.

Implementation of the national commercial building energy code could cut 237 million tons of carbon by 2020.

### **Tax and Fiscal Policies to Promote Building Code Implementation**

China builds more new buildings each year than any other country. Yet, the buildings are much less efficient than the world best practice. Increased construction costs associated with energy-efficient buildings, combined with a dearth of available advanced technologies give developers little incentive to comply with energy codes. A strict supervision system could create market opportunities for new, efficient technologies, while incentive policies could encourage developers to exceed the code. This project supports the Energy Research Institute (ERI) under NDRC to analyze policy options that could best stimulate an efficient buildings market.

In April 2005, ERI started work with tax and fiscal policy experts as well as building efficiency experts to review international best practices and identify barriers to efficient products in China's buildings market. NRDC's David Goldstein is working with the Chinese team to provide international best practice guidance and training. He is a well-known expert in the building energy efficiency field.

### **Energy Efficient Windows Initiative**

The China Energy Efficient Windows Initiative is a collaborative among the Research Institute for Standards and Norms (RISN) under MOC, and international consultants LBNL, the Alliance to Save Energy (ASE), and energy codes expert John Hogan. The goal is to integrate energy efficient fenestration products into China's building energy codes and construction practices. The team is working with grantees in the Hot-Summer Warm-Winter zone to develop residential codes that promote efficient windows. Results to date include voluntary window labels and ratings similar to the National Fenestration Rating Council (NFRC) or Energy Star Window labels used in the U.S.

The team has launched a pilot in Guangdong Province that is developing software, an administrative support structure, an energy performance catalog, and criteria for energy performance and endorsement labels. The team is promoting the program to the Chinese glass and windows industries. If successful, the pilot could initiate a national program that could involve the entire windows industry.

**Recommendation:** This project needs the help of senior leaders to ensure coordination among government agencies, industry associations, R&D organizations, manufacturers, and quality inspection bodies.