2006

Cooperation Targets: From Industry to Energy Services

Stephanie Ohshita
University of San Francisco, sbohshita@usfca.edu

A Meier

S Wiel

G Heggelund

Recommended Citation
Ohshita, S. B., Meier, A., Wiel S., & Heggelund, G. (2006). Cooperation Targets: From Industry to Energy Services. In Sugiyama, T. & S. B. Ohshita (Eds.), Cooperation Structure: The Growing Role of Independent Cooperation Networks (pp. 79-94). Winnipeg: IISD.

Chapter 5
Cooperation Targets: From Industry to Energy Services

By Stephanie Ohshita, Alan Meier, Steve Wiel and Gørild Heggelund

Our research has identified three key trends in existing energy efficiency cooperation. The first, discussed in Chapter 3, is the growing role of independent, international cooperation networks in facilitating large-scale energy efficiency improvements. The second, explored in Chapter 4, is the increasing importance of policy development cooperation as an effective mechanism for promoting significant energy savings and greenhouse gas reductions. In Chapter 5, we examine cooperation activity sector by sector and note increasing activity in certain economic sectors with numerous, diverse actors, most notably in appliances, transportation and buildings. In the industrial sector, there is a trend from "hard" technology cooperation (e.g., technology transfer) to "soft" cooperation involving capacity building and policy tools such as voluntary agreements and energy management systems.

To date, a great deal of energy-related development cooperation has focused on expanding energy supply. Supply-side energy cooperation typically involves large-scale infrastructure projects: power plants, dams, transmission and distribution lines. These large-scale projects inherently involve large amounts of funding and large organizations: central government ministries; large construction firms; large energy technology firms; and large bilateral or multilateral development banks.[1]

In contrast, energy efficiency and conservation efforts involve energy end-users as well as energy suppliers. Energy conservation cuts across several economic sectors and a more diverse set of organizations and individuals, from energy-intensive industries and appliance and automobile manufacturers, to retail stores, local agencies that issue building codes and permits, and individual consumers and motorists. To induce change among these various actors, an inherently different approach is needed—one that creates the requirements and incentives for change—change in behavior, management, operational practice and technology.

Because energy efficiency and conservation efforts are of a significantly different nature than the more traditional development of large-scale energy supply infrastructure, those involved in cooperation have been turning to different organizational structures or cooperation mechanisms, and have targeted different economic sectors.

1 Certainly there has been cooperation on smaller-scale energy supply, e.g., rural residential energy supply or distributed generation for rural enterprises. Here we emphasize cooperation on large-scale energy supply projects to highlight the contrast between supply-side and demand-side targets.

Table 5.1 summarizes existing energy efficiency cooperation in East Asia by target sector. Due to its historically large share of energy consumption, the industrial sector has been targeted the most. Cooperation in this sector involves bilateral, multilateral and independent organizations. Bilateral cooperation has been significant, while regional efforts are notably absent. The energy-intensive steel, cement and chemical sub-sectors have been engaged in energy-efficient technology cooperation, as well as management training efforts and the exploration of voluntary (i.e., negotiated) agreements on energy conservation and efficiency. Not surprisingly, the country most frequently targeted for industrial efficiency cooperation is China, the country with the largest share of industrial energy consumption.

In the appliance sector, we see the involvement of multilateral, regional and independent organizations, and a heavy emphasis on policy development and market development cooperation. For the buildings, transportation, public and financial sectors—as well as demand-side management targets—we find that cooperation is more often done in a mode other than a bilateral agreement, i.e., through the GEF or other multilateral efforts, or with independent cooperation networks, or through regional coordination efforts.

Table 5.1. Target sectors and technologies in existing energy efficiency cooperation in East Asia, 1990s–present.

Industry (Steel, Chemicals, Cement, Boilers)
• Japan-China-SE Asia: Green Aid Plan technology demonstration in steel, chemicals and cement; energy manager training
• U.S.-China: industrial motor efficiency standards
• U.K.-China: energy conservation plans for Top 1,000 Energy-Using Enterprises
• GEF-World Bank-China: manufacturing license transfer for efficient industrial boilers
• Energy Foundation (CSEP)-China: steel sector voluntary agreements
• GEF-UNDP-China End-Use Energy Efficiency Program (EUEEP)
• EU-China Energy & Environment Program (EEP)
Appliances
• CLASP-China: standards & labels (S&L) for air conditioners, washing machines, TVs, computers, etc.
• CLASP-ASEAN: S&L coordination
• CLASP-APEC: S&L coordination
• Energy Foundation CSEP-China: S&L policy development
• GEF-UNDP-China: commercialization of efficient refrigerators
Electric Power
• Japan Green Aid Plan: efficient generation technology transfer, sulfur dioxide control
• EC-ASEAN Co-generation
Demand-side Management (ESCOs/EMCs)
• GEF-World Bank-China: launch of Energy Management Companies (EMCs)
• GEF-WB-Thailand: DSM Program
• ADB-Asia: creation of an Energy Service Company (ESCO) Fund, starting in India, Malaysia, the Philippines, and Thailand
• ADB-China: "Efficiency Power Plant" (promoting DSM rather than new supply)

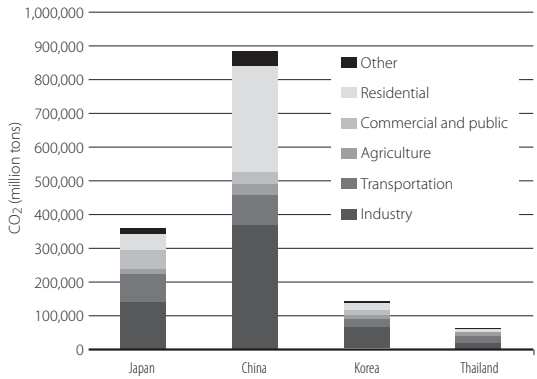
Buildings
• Energy Foundation-China: development and launch of zone-based building codes
• U.S.-China Green Buildings: technical support for zone and building code development
• EU-China Energy and Environment Program (EEP)
• REEEP-China: technical support for design of efficient buildings in Western China
Transportation
• Energy Foundation-China: development and launch of automobile fuel economy standards
• ASEAN-Australia
Public Sector (Government)
• PePS-China: government procurement requirements for energy-efficient products
Financial Sector
• Energy Foundation-China: policy development of fiscal incentives for energy conservation
• REEEP-China: creation of innovative energy fund and financing mechanisms

The rest of this chapter provides examples from each sector, highlighting the achievements, difficulties, and implications for future cooperation.

5.1 Industry Looms Large: Still Significant Potential for Energy Savings

Industrial energy use represents a large share of most countries' total final energy consumption— close to 40 per cent for China, Japan and Korea (see Figure 5.1).[2] Within industry, steel, cement, and chemicals dominate energy consumption (see Figure 5.2 for a breakdown of energy consumption by sub-sector).

Figure 5.1. Sectoral energy consumption in selected East Asian countries (2003).

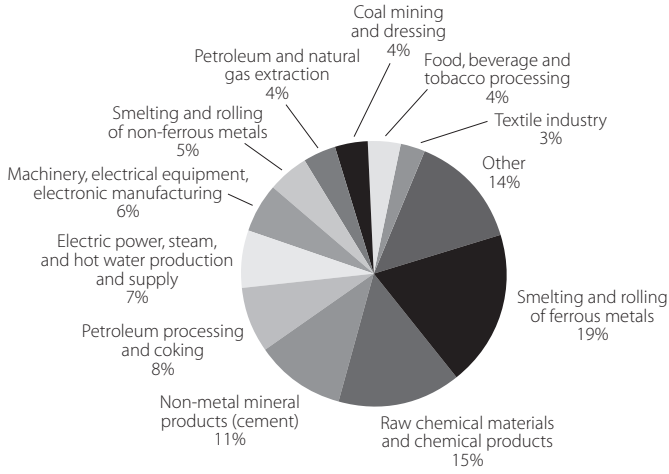


Source: Based on data from IEA Energy Statistics, http://www.iea.org

Note: Figures represent total final consumption, which includes biomass and other combustibles in the residential sector.

2 Based on total final energy consumption data, IEA energy balance tables for 2003.

Figure 5.2. Industrial energy consumption in China (shares by sub-sector, 2002).



Source: Based on data in LBNL (2004), China Energy Databook.

While energy consumption is significant, so are the opportunities for efficiency improvements and energy savings. A notable example of energy savings potential is China's steel sector. The typical physical energy intensity of steel production in China is about 30 GJ/tonne steel, compared to 20 GJ/tonne steel in Japan. Compared to other steel producing countries (such as the U.S., Germany, France and the U.K.), the energy intensity of steel production in China is 15 to 37 per cent higher. Estimates of potential energy savings indicate that reductions of 0.64 EJ could be achieved in China in the near future through process adjustments (Price *et al.*, 2000).

Recognition of this potential has led the Chinese government and steel industry to engage in a number of cooperative efforts. On a bilateral basis, technology cooperation projects have been carried out in nine Chinese steel plants through Japan's Green Aid Plan, beginning in the early 1990s (refer to Chapter 4 for further discussion). Other forms of cooperation have included the exploration of new policy mechanisms to promote energy efficiency, namely voluntary agreements. Work on voluntary agreements has involved steel plants in Shandong Province with initial support from the Energy Foundation; this work is being extended through the GEF (see Chapter 6 for discussion of further cooperation using voluntary agreements).

In addition to governmental cooperation efforts in the steel sector, industry associations can play an important role in formulating energy conservation strategies that will work in the marketplace. A notable example of this is ongoing dialogue between Japanese and Chinese steel industry associations. A pri-

vate-sector forum of steel companies held in Beijing in July 2006 demonstrated the active role industry can take to promote energy efficiency.[3]

While a number of cooperation activities have targeted the industrial sector, many challenges still need to be addressed:

- Other energy-intensive sub-sectors need more efficiency improvements (e.g., chemicals and cement). The new U.K.-China cooperation on the Top 1,000 Energy Consuming Enterprises will target some of this, as will the GEF-UNDP-EUEEP and the EU EEP. As the details of those efforts are specified, it is likely that there will still be room to coordinate more activity.
- Approaches are needed to engage large numbers of small- and medium-size enterprises (SMEs), which often have limited financing and technical capabilities.
- Cross-cutting industrial technologies need more work (e.g., motors, pumps and boilers). Past efforts in technology cooperation and standard-setting have targeted these technologies (e.g., the U.S.-China industrial motor project and the GEF-World Bank-China industrial boiler project) but strategies involving policy development are needed.
- While much past cooperation has been in the form of technology development, more efforts are needed to develop policies and promote market development, including financing measures for energy efficiency investments. The GEF-UNDP-EUEEP and the EU EEP incorporate those strategies into their programs.
- Implementation support is needed along with policy development, to work out the details of promoting industrial efficiency measures at the local level. Cooperation experience with pilot projects at the provincial and municipal levels confirms the need for interfacing with local-level government and industry.

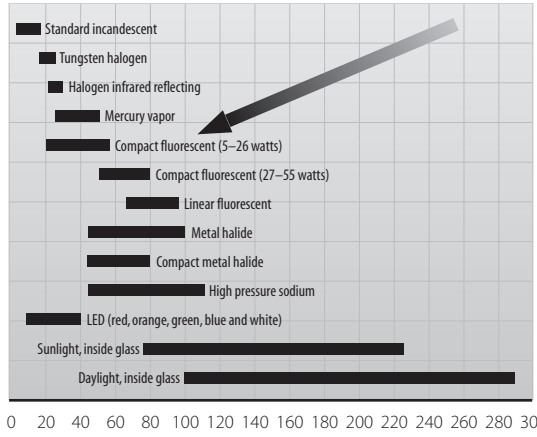
5.2 Appliance Energy Efficiency: Saving Billions, One Watt at a Time

Of the many appliances with growing energy consumption in developing countries, lighting is a major end-use of electricity. In China, the efficiency of lighting equipment is often low, making this fundamental energy service a large economic burden on consumers. Thus, improving the efficiency of lighting will have important economic benefits and, if linked to strict performance criteria, can also lead to higher productivity and reduced accidents.

3 The industry-organized forum involved the largest steel producers in Japan and China, and brought key government officials together with industry representatives from both countries.

Illumination is an extraordinarily complex topic because the human eye responds to a range of lighting levels spanning many orders of magnitude. It involves more that just a light fixture; it involves physics, engineering, economic factors, human factors (e.g., purchasing preferences and illumination preferences) and biology (e.g., how the eye responds to the color spectrum of different types of lighting). Energy-efficient lighting requires consideration of all these aspects in addition to the fixtures used to deliver light, the schedule of lighting requirements and the presence of daylight, to name a few. Nevertheless, major savings can be achieved by focusing on improving one aspect, such as the efficiency of the light bulb. The potential energy savings gained by shifting from incandescent to compact fluorescent lights are shown in Figure 5.3. Compact fluorescents give much more light per unit of energy consumed (20–55 lumens per watt) than standard incandescent lights (5–18 lumens per watt).

Figure 5.3. Comparison of relative energy consumption in light sources.



Source: Based on IEA data in IEA 2006.

Ensuring that the lighting product meets key performance characteristics will raise consumer confidence and encourage greater use. This has been the strategy adopted by numerous lighting programs around the world.

The Efficient Lighting Initiative (ELI) is an excellent example of a modest investment creating the infrastructure to allow rapid growth in consumer use of efficient lighting products.[4] The ELI, established in 2000, is an international branding system for lighting products that are both efficient and of high quality. Interested manufacturers may qualify their lighting products to carry the ELI logo by showing that they comply with ELI technical specifications.

4 For more information about ELI, see: http://www.efficientlighting.net

First, ELI developed the concepts that would allow certification and labeling of lighting products. It tested these concepts in seven countries for three years. In 2005, the China Standard Certification Center (CSC) expanded the ELI certification and branding system globally. This expanded ELI program is operated by the ELI Quality Certification Institute, which is led by CSC with assistance from a team of international experts from Asia, North America and Latin America.

ELI researched, developed, and "branded" the following voluntary technical specifications for energy-efficient lighting:

- Self-ballasted Compact Fluorescent Lamps (March 2006)
- Double-capped Fluorescent Lamps (August 2006)
- Fluorescent Lamp Ballasts (to be launched in December 2006)

But ELI's activities covered much more than technical specifications. They also created brand recognition and promoted consumer recognition of the benefits of branded products. In the Philippines, for example, ELI engaged a national celebrity to promote quality in an effort to combat the flourishing black market in illegally-imported, poor-quality compact fluorescent lamps.

Future ELI specifications will cover other types of energy-efficient lighting. In addition, ELI encourages manufacturers to produce low-toxic and environmentally-friendly lighting products, and the manufacturers' statement for low-toxic content is preferred and encouraged by ELI.

Who paid and what did outside funds pay for?

ELI was initially supported by a US$15 million investment from the Global Environment Facility (GEF). This supported much of its activities between 1999 and 2003. In addition to the technical development activities described above, GEF's investment in ELI allowed it to support activities the market was unlikely to undertake on its own—such as consumer education and quality assurance. In this way, IFC was able to go beyond the use of subsidies to accelerate market acceptance for an environmentally-beneficial technology. The GEF also funded an independent evaluation of the energy saved from ELI's activities.

Further program development in the lighting sector

Saving energy in lighting can be approached in many different ways. Even though impressive gains have been achieved through more efficient lights, there remain large potential savings through further improvements in the light fixtures. Other programs can target neglected aspects of lighting beyond bulbs, such as lighting controls, conversion of kerosene lamps to low-power Light Emitting Diodes (LEDs) and street lighting.

5.3 From the Ground Up: Building Efficiency

Along with utilizing efficient appliances, the design of building structures themselves has a tremendous influence on the amount of energy consumed. The building materials, orientation, insulation, windows, and heating, ventilation and cooling (HVAC) systems all influence total energy consumption in the buildings sector. Incorporating efficiency standards into new building construction is important, as are efforts to retrofit and conserve energy in existing buildings.

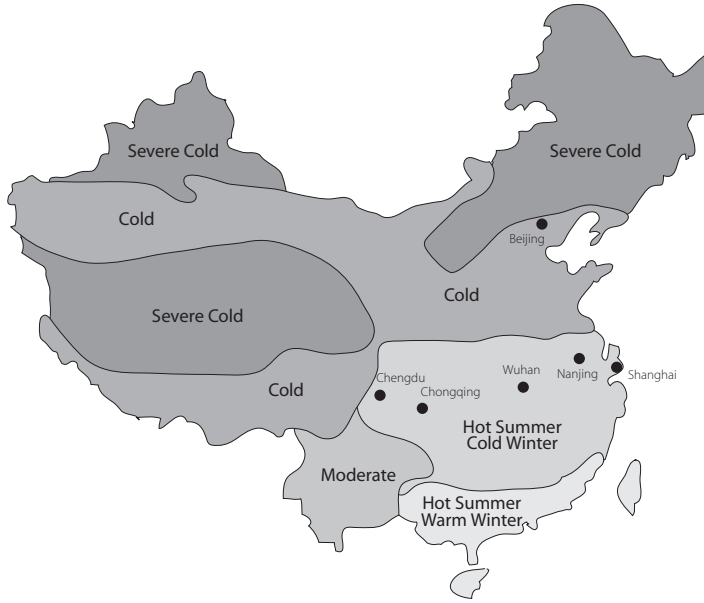
Several important steps must be taken before a region can begin to design and build large numbers of energy-efficient buildings. The first step is to establish building codes (or norms) incorporating minimum energy efficiency requirements. These codes must reflect typical building styles and technologies. Furthermore, the required levels of efficiency must be shown to be feasible and cost-effective. Most building codes are developed with computer tools that can simulate the energy use of a prototype building. These tools, in turn, require detailed data about the climate (temperature, sunlight, humidity, etc.) and physical properties of building materials (such as the thermal resistance of bricks).

The Energy Foundation supported the initial work of several researchers to create typical building prototypes, perform the necessary simulations, and identify optimum levels of insulation and other parameters for buildings in China. Participants in the effort included: China's Ministry of Construction (MOC); China Buildings Energy Efficiency Association; Shanghai Tongji University; Lawrence Berkeley National Laboratory; and the Natural Resources Defense Council. As a result of the collaboration among these participants, China was able to introduce a comprehensive, consistent building code for energy efficiency covering the entire country. The country has been divided into a few large climate zones (see Figure 5.6). A set of codes for typical building categories were developed for each climate zone. For simple buildings, builders can choose to follow a prescriptive list of measures. For large and complex buildings, the designer needs to achieve a certain energy budget (typically expressed in energy use per square meter) in order to comply.

To date, participants in the effort have successfully developed state-of-the-art residential and commercial building codes, which have been adopted nationally. By the end of 2003, MOC had issued a new residential building code for the Hot-Summer Warm-Winter (HSWW; South China) climate zone. Promoting efficiency in the buildings sector is challenging because many decision-makers are involved, and many decisions are made at the local level. To address this, cooperation efforts in China have included "top-down" as well as "bottom-up" approaches. From June 2004, this project supported HSWW code implementation at the local level, helping MOC to implement the new code in Guangzhou, Shenzhen, Fuzhou and Xiamen. Shanghai has imple-

mented a state-of-the-art commercial building code. A national commercial building code was approved by MOC in April 2005 and took effect on July 1, 2005. ERI has started working with tax and fiscal policy experts as well as building efficiency experts to review best practices internationally and identify barriers to efficient products in China's buildings market.[5]

Figure 5.6. Climate zones for Chinese building codes.



Source: Energy Foundation 2005.

5.4 Serving End-Users: Creating Energy Service Companies (ESCOs) and Energy Management Companies (EMCs)

Energy service companies (ESCOs) help clients to overcome the many barriers to energy efficiency improvements, using market-based financing strategies. ESCOs typically offer the following services:

- the design and financing of energy efficiency projects, including: high-efficiency lighting; high-efficiency heating and air conditioning; efficient motors and variable speed drives; and centralized energy management systems;
- the installation and maintenance of energy-efficient equipment;

5 For more information on Chinese building code developments, see program brochures and project reports of the China Sustainable Energy Program (CSEP), available on the Energy Foundation Web site: http://www.efchina.org/home.cfm.

- the monitoring and measurement of project-related energy savings; and
- risk guarantees for energy and utility cost savings.

What distinguishes ESCOs from other firms that offer energy efficiency consulting is the concept of performance-based contracting. When an ESCO undertakes a project, its compensation—and frequently the project's financing—are directly linked to the amount of energy that is actually saved. Because some energy efficiency retrofits may require a large initial capital investment, the payback period for the investment can be relatively long. To overcome these financing barriers, the client's debt payments are tied to the energy savings offered under the project so that the customer pays for the capital improvement with the money that comes out of energy cost savings.[6]

The use of ESCOs in countries where energy markets are in transition can be challenging. Cooperation efforts must, therefore, include the introduction, demonstration and dissemination of new project financing concepts and market-oriented institutions. To promote and implement market-based energy efficiency initiatives in China, for example, new strategies are needed since many of the administrative measures previously used to promote energy conservation (under central planning) are becoming inapplicable. The World Bank observed that "market incentives for energy conservation are increasing, but knowledge among most enterprise managers of the most effective energy efficiency options is weak, and the institutional system for promoting energy conservation has little experience with the types of methods and mechanisms which can best assist enterprises in the new environment" (World Bank, 2002).

In 1998, the World Bank launched a seven-year GEF Energy Conservation Project in China, focused on the establishment of energy management companies (EMCs)—known outside China as energy service companies (ESCOs).[7] The project involves performance contracting, providing energy efficiency audits and services at no initial cost, but rather a contractual agreement for later payments based on energy savings. The initial phase of the China Energy Conservation Project consisted of the establishment of three pilot EMCs, located in Beijing, Liaoning and Shandong, and the establishment of the Energy Conservation Information Dissemination Center (ECIDC). As of 2002, the three EMCs had completed over 200 projects with electric motor systems, arc furnaces, lighting and industrial boilers, among others. The three EMCs established during Phase I of the project are estimated to generate energy savings of 45 million tons of coal equivalent (Mtce) and an associated emissions reduction of 34 million tons of carbon. These savings are over the life of investments undertaken during Phase I (World Bank, 1998; 2002).

---

6 For an overview of ESCOs, see: http://www.naesco.org/about/esco.htm

7 According to Baldinger (2002), since the term "energy service company" is already used in China for a different type of organization, the Chinese have coined a different name for their ESCOs—energy management companies, or EMCs.

In other ESCO activity, the Shanghai Economic Commission and LBNL jointly sponsored an international ESCO workshop in September 2003. Ten international experts from ESCOs in the U.S. and Japan were brought together with an audience of 100 senior policy-makers and executives in Shanghai. Key points emerging from the workshop included:[8]

- the early development of the ESCO industry was supported by DSM and other enabling policies;
- in contrast to China's focus on industries, commercial buildings are the dominant market segment for ESCOs in other countries;
- in contrast to the "shared saving" model promoted by the World Bank, a "guaranteed saving" model has been key to the success of ESCOs in many countries; and
- local, long-term commercial financing is critical to ESCO industry growth.

In December 2003, the Asian Development Bank announced its new fund for ESCO activities in Asia to catalyze energy efficiency and renewable energy markets. The fund will provide equity capital, financial engineering, technical and carbon-related skills, and training to ESCOs on a project-by-project basis. It will also partner with Asian-based ESCOs to deliver energy efficiency services and renewable energy to selected industrial, commercial and public sector customers. The initial equity investment in the fund was $20 million from two large founding investors: Mitsubishi Corporation, the Japanese industrial giant; and Chubu Electric Power Company, Japan's third largest electricity utility. Initially, the ADB fund will support projects in India, Malaysia, the Philippines and Thailand, consistent with energy efficiency policies in those countries. As the fund evolves and matures, projects in Bangladesh, the People's Republic of China, Indonesia, Sri Lanka and Vietnam will be evaluated and launched.[9]

5.5 Improving Government Efficiency: Cooperation on Public Sector Procurement Policies

The government (public sector) uses 10–20 per cent of the total energy consumed in most countries, Efficiency in the public sector generally gets less attention than the already insufficient energy-saving policies and programs for other sectors. This is true in industrial economies as well as developing and transitional economies. Government energy efficiency not only saves energy, it also saves money for taxpayers while avoiding pollution and greenhouse gas emissions. "Leadership by example" is a powerful way for the government to

8 For more on LBNL activity on ESCOs in China, see: http://china.lbl.gov/china_policy-e.html

9 For more information on ADB's Asian ESCO effort, see: http://www.adb.org/Documents/News/2003/nr2003176.asp

lead the economy toward greater energy efficiency, especially in areas where public facilities and services are the largest users of energy or the largest buyers of energy-using equipment. Opportunities exist throughout the public sector, as can be seen from the list of activities already undertaken by some countries, shown in Table 5.2 (East Asian countries are noted in **bold**). The efforts in Table 5.2 include efforts by individual countries as well as those undertaken in cooperation with others.

Table 5.2. Existing public sector energy efficiency programs.

Program Categories	Country Examples
Policies, Targets and Reporting	Argentina Brazil Ecuador Mexico **Philippines** Russia
• Energy savings goals; tracking and reporting progress	
• Government organization (e.g., lead responsibility for energy savings, inter-agency committees)	
• Budget policies (e.g., life-cycle costing, separating budget lines for energy, energy cost savings sharing among agencies)	
Existing and New Public Buildings	Australia Brazil Mexico New Zealand Russia **Thailand** U.S.
• Energy audits	
• Retrofit projects: lighting, HVAC, building envelope, controls	
• Financing: third-party (ESCO) funding, loan funds, leasing	
• Efficiency standards and guidelines for new buildings	
• Design assistance, software tools, architect training	
• Technology demonstrations or showcase facilities	
• Building system commissioning: pre-occupancy and ongoing	
• Energy metering/monitoring, benchmarking, operations feedback	
Energy-efficient Procurement	**Korea** **Japan** U.S. **China** (in development) Mexico (in development)
• Specify and purchase efficient building equipment, office equipment, motors, lighting and appliances	
• Efficient and alternative fuel vehicles for government fleets	
• Green power purchasing	
Public Services: Transport, Water and Utilities	Argentina Brazil Colombia India Mexico
• Water supply and treatment systems	
• Street lighting, LED traffic signals	
• Public transport (transit operations, bus driver training, etc.)	
• O&M for fleet vehicles; promoting ride-sharing and transit	
Training, Information and Recognition	Australia Mexico New Zealand **Philippines** U.S.
• Facility manager training and certification	
• Operator incentives and recognition (awards)	
• Employee information and outreach campaigns	

Promoting an Energy-efficient Public Sector (PePS) is a collaborative effort among government and non-governmental organizations. It was formed in 2001 with a mission to encourage and assist governments (national, provincial and local) to use energy more efficiently in their own facilities, vehicle fleets and operations. Drawing on experience from industrial as well as developing

economies, the PePS partnership provides tools, guidance, examples and technical assistance to public sector energy savings efforts ranging from energy-efficient product purchasing to sustainable design and alternative financing for energy projects in public facilities. PePS helps spread the concept of public sector energy management to developing countries; encourages new and expanded initiatives; and promotes information exchange among countries. The overall goal of the program is to achieve direct energy and cost savings in these countries, and to play a key role in sustainable development by harnessing government's purchasing power to create or expand domestic markets for energy-efficient products and services.

At the project level, PePS partner organizations, with support from one or more sponsors, identify project opportunities; establish needs and sources of funding; and provide technical assistance to in-country lead organizations. At the level of global information and tools, several dozen experts from around the world have contributed case study material to the PePS Web site, prepared sections of the PePS Guide, or assisted as reviewers of draft materials for the Guide. PePS' registration as a UN Sustainable Development Partnership is a key mechanism for coordination; the program continues to welcome inquiries, suggestions and proposals for new projects from government and non-governmental organizations in every region.

To date, PePS, with financial support from national governmental agencies and foundations, has: (1) developed an online library of resource materials, case studies and software tools (including a spreadsheet for estimating energy, cost, carbon and pollution savings from energy-efficient government purchasing); (2) prepared a guide to efficient energy management in the public sector; and (3) conducted strategic outreach and training at workshops and conferences in the U.S., China, Mexico, India, South Africa, the Middle East and Europe (Van Wie McGrory *et al.*, 2002). In East Asia, PePS helped the Chinese government develop a new policy in 2004 and implement an energy-efficient procurement program.

PePS is currently focused on further developing a global public sector efficiency Web site (http://www.pepsonline.org); completing the PePS Guide, a handbook for practitioners on government sector energy efficiency; initiating new national and regional projects; and developing international standards of practice for public sector energy management.

5.6 Integrated Strategies: Multi-Sectoral Efforts

While some cooperation efforts emphasize a particular cooperation mechanism or a particular cooperation target, others recognize synergies and combine approaches. Policy development cooperation often incorporates capacity building. Technology cooperation is more effective when combined with market development. Similarly, cooperation efforts targeting a particular industry

may be enhanced by cooperation on a cross-cutting technology, such as boilers. Development of efficiency standards and labels for appliances leads to real energy conservation when combined with purchasing guidelines for the public sector as well as public information campaigns aimed at individual consumers. Two big cooperation efforts that take an integrated multi-sectoral approach are the GEF-UNDP-EUEEP and the EU EEP in China. The latter program and its cross-cutting sectoral targets are discussed here.

The EU Energy and Environment Program (EU EEP) is an example of an integrated approach that recognizes the need to create policy incentives that promote the diffusion of technology. The EUEEP was initiated in 2003 and will run until 2008. Total funding amounts to €42.9 million with the EU providing €20 million of that.[10] The EEP cooperation involves assistance for policy development at the central state and local levels. Other target groups for policy development aid include industry associations, labeling agencies, research institutes and energy management companies. The program is executed by the Ministry of Commerce, while the National Development and Reform Commission (NDRC), Energy Research Institute, the Ministry of Science and Technology (MOST), and China National Petroleum Corporation are involved in implementation of the program.

The program involves technical assistance, technology development, policy development capacity building, and market development. There are four major program components: energy policy development; energy efficiency; renewable energy; and natural gas. A Project Management Unit (PMU) has been established in Beijing to implement the program. Within the energy efficiency component, five priority areas have been identified in collaboration with the Department of Environment and Resource Conservation (DERC) of the NDRC. Goals and achievements are:[11]

- Strengthening policy development capacity
  - Supported the publication of the bilingual version of the China Medium and Long Term Energy Conservation Plan and organized a dissemination seminar in January 2005.
  - Providing support to the ongoing reform of China's monitoring system for energy conservation as well as NDRC's new priority policy for building a resource-saving society through a Call for Proposals, launched in January 2006.
- Standards, labels and certification
  - An energy efficiency component will support the Chinese government's energy labeling promotion campaign.

10 See the EU EEP Web site for further information and program updates: http://www.eep.org.cn

11 See the EU EEP Web site for further information and program updates: http://www.eep.org.cn

  - Providing support for the implementation, monitoring and enhancement of the effectiveness of existing standards, labels and certification programs (participated in conference on Set Top Boxes by Chinese manufacturers in 2005).

- Energy-intensive industries
  - Assisting the energy-intensive industries in achieving their energy-saving potential by making the necessary benchmarking information available for evaluating the energy saving potential in key industry sectors.
- Small and medium-sized boilers
  - Improving energy efficiency and reducing pollutants in small and medium-sized boilers and kilns.
  - Organized a workshop on the subject.
  - Released a report in January 2005 reviewing previous international cooperation efforts and large-scale technology popularization projects on energy conservation and environmental protection retrofits of boilers.
- Incentives to promote energy savings in China
  - Designing and demonstrating appropriate incentives to promote energy savings in China.
  - Promoting experiences and lessons learned in Europe on the use of incentives in achieving energy savings in government, transport and in the promotion of energy-efficient equipment.

It took some effort and time to set up the EU EEP due to the need to reach agreement among numerous stakeholders. Some activities took place in 2004 (study tour, workshops, etc.); late 2005 (conference); and the beginning of 2006 (Call for Proposals, etc.). It is still too early to tell what the major achievements of the program will be, yet the combination of technology, policy initiatives and financial mechanisms is promising.

5.7 Conclusion: Opportunities and Challenges in Cooperation Targets

Industry remains a critical sector for energy efficiency and conservation cooperation due to its historically large energy consumption. We conclude that more cooperation on policy and market development can help overcome technology diffusion challenges. While industry remains important, we observe a trend toward cooperation on more distributed targets with rapidly increasing energy consumption (e.g., appliances, buildings and transportation). Cooperation on appliance S&L has been yielding large energy savings and

promoting market transformations, while implementing organizations develop their capacities. There is a strong foundation of success for future work on appliances, and there is still more to do. The building sector is more challenging, since building codes and permits are typically decided at the sub-national level. The potential for efficiency improvement is great, however, so innovative strategies are needed. Important experience has been gained in early efforts on demand-side management and energy service companies. While market and institutional challenges need to be overcome, cooperation in this area is likely to expand during the rest of this decade. Cooperation on public sector procurement and infrastructure programs has only begun, and could be a significant mechanism for promoting energy conservation in other sectors.