

# Cooperative Climate

ENERGY EFFICIENCY ACTION IN EAST ASIA



Edited by Taishi Sugiyama and Stephanie Ohshita



Central Research Institute of  
Electric Power Industry



# Cooperative Climate

ENERGY EFFICIENCY ACTION IN EAST ASIA

Edited by Taishi Sugiyama and Stephanie Ohshita



©2006 Central Research Institute of Electric Power Industry; University of San Francisco; and International Institute for Sustainable Development

Published by the International Institute for Sustainable Development for Central Research Institute of Electric Power Industry, Japan (<http://criepi.denken.or.jp/en/>); and the University of San Francisco, United States (<http://www.usfca.edu/>).

The International Institute for Sustainable Development contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change and energy, measurement and assessment, and sustainable natural resources management. Through the Internet, we report on international negotiations and share knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and better dialogue between North and South.

IISD's vision is better living for all—sustainably; its mission is to champion innovation, enabling societies to live sustainably. IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States. IISD receives core operating support from the Government of Canada, provided through the Canadian International Development Agency (CIDA), the International Development Research Centre (IDRC) and Environment Canada; and from the Province of Manitoba. The Institute receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations and the private sector.

International Institute for Sustainable Development  
161 Portage Avenue East, 6th Floor  
Winnipeg, Manitoba  
Canada R3B 0Y4  
Tel.: +1 (204) 958-7700  
Fax: +1 (204) 958-7710  
Web site: <http://www.iisd.org>

Cooperative Climate: Energy Efficiency Action in East Asia

Edited by Taishi Sugiyama and Stephanie Ohshita

ISBN 1-895536-92-8

Available online at [http://www.iisd.org/pdf/2006/cooperative\\_climate.pdf](http://www.iisd.org/pdf/2006/cooperative_climate.pdf)

About the cover: Examples of energy-efficient products (top to bottom): fluorescent ceiling lamp; induction heating cooker; heat-pump washing machine (by Panasonic); Hybrid car “Prius” (by Toyota). Image of map from iStockphoto.



Printed on 100% post-consumer recycled paper.

# Table of Contents

<b>Acronyms</b>	<b>ix</b>
<b>Executive Summary</b>	<b>xi</b>
<b>Part I: Introduction</b>	<b>1</b>
<b>Chapter 1. Climate Change, Asian Economy, Energy and Policy</b> by Taishi Sugiyama	<b>5</b>
1.1 Global Climate Policy at a Crossroads	5
1.2 Changing International Relationships in Asia: Economic Development, International Cooperation and Technology Transfer	7
1.3 Policy Development and Regulatory Harmonization: Opportunities	8
<b>Chapter 2. The Need for Energy Efficiency Cooperation</b> by Taishi Sugiyama, Gørild Heggelund and Takahiro Ueno	<b>11</b>
2.1 What Energy Efficiency Can Do for East Asia – and the Planet	11
2.2 Domestic Political Context of Energy Conservation – Increasing Political Attention	14
A. China’s current energy policy and political setting	14
B. Current energy efficiency policies in East Asia	18
C. Why domestic policies are the key to promoting energy efficiency	25
2.3 Common Interests in Energy Efficiency: Beyond the Climate Policy Stalemate	26
2.4 Why the CDM Cannot Deliver Massive Energy Savings	27
A. Brief history of the CDM	28
B. Can the CDM deliver energy efficiency?	29
2.5 Conclusion	32
<b>Part II: Existing Energy Efficiency Cooperation in East Asia</b>	<b>35</b>
<b>Chapter 3. Cooperation Structure: The Growing Role of Independent Cooperation Networks</b> by Stephanie Ohshita, Steve Wiel and Gørild Heggelund	<b>39</b>
3.1 Experience from Bilateral Cooperation	40
3.2 Experience from Multilateral Institutions	45
3.3 Possibilities for Regional Cooperation	51
3.4 A New Model: Independent, International Cooperation Networks	56
3.5 Conclusions: The Growing Role of Independent Cooperation Networks	61

<b>Chapter 4. Cooperation Mechanisms: A Shift Toward Policy Development Cooperation</b>	<b>63</b>
by Stephanie Ohshita	
4.1 Forms of International Cooperation on Energy Efficiency and Conservation	63
4.2 Lessons Learned from Technology Cooperation and Development Assistance	66
4.3 How Policy Development Cooperation Works	71
4.4 A Shift Toward Policy Development Cooperation	74
4.5 Conclusion: Policy Development Cooperation that Builds Capacity, Creates Incentives and Transforms Markets for Energy Efficiency	76
<b>Chapter 5. Cooperation Targets: From Industry to Energy Services</b>	<b>79</b>
by Stephanie Ohshita, Alan Meier, Steve Wiel and Gørild Heggelund	
5.1 Industry Looms Large: Still Significant Potential for Energy Savings	81
5.2 Appliance Energy Efficiency: Saving Billions, One Watt at a Time	83
5.3 From the Ground Up: Building Efficiency	86
5.4 Serving End-Users: Creating Energy Service Companies (ESCOs) and Energy Management Companies (EMCs)	87
5.5 Improving Government Efficiency: Cooperation on Public Sector Procurement Policies	89
5.6 Integrated Strategies: Multi-Sectoral Efforts	91
5.7 Conclusion: Opportunities and Challenges in Cooperation Targets	93
<b>Part III. Proposal for a New Energy Efficiency Policy Development Fund</b>	<b>95</b>
<b>Chapter 6. The Fund Proposal</b>	<b>99</b>
by Taishi Sugiyama, Steve Wiel, Alan Meier and Jonathan Sinton	
6.1 Key Design Issues	99
A. Requirements of the Fund	99
B. Political agreement	100
C. Modality of the Fund	101
D. Project coverage by the Fund	103
6.2 The Policy Development Fund	104
A. The Fund Proposal	104
B. Example projects	107
C. Political feasibility with key stakeholders	117
D. Cost-effectiveness of the Fund	123
E. A future scenario	124
6.3 Summary	126
<b>References</b>	<b>131</b>

## **Acknowledgements**

The authors thank the many interviewees and reviewers of the book drafts for their valuable input. The authors thank the Institute of Energy Economics of Japan; Energy Research Institute of China; and the Korean Energy Research Institute for co-hosting and participating in the workshops. The research activity was funded by the Japanese Central Research Institute of Electric Power Industry.

### **Disclaimer**

This book was prepared to rapidly communicate research findings to the climate policy community. While this document is believed to contain correct information, the author(s) and their affiliated organizations do not make any warranty or assume any legal responsibility for the accuracy or completeness of any information, nor for any consequence of their use. Reference herein to any specific commercial product, process or manufacturer does not necessarily constitute or imply its endorsement, recommendation or favoring. The findings, interpretations, and conclusions expressed in this book are entirely those of the authors and do not necessarily state or reflect those of their affiliated organizations.



## About the Authors

**Gørild Heggelund** is Director of the Global Program and Senior Research Fellow at the Fridtjof Nansen Institute, Norway. Her main research areas are China's energy and climate, and environmental policy in general. Heggelund participated recently in the OECD Environmental Performance Review (EPR) of China (to be published in 2007). She is currently carrying out research on China's climate change policy-making including the developments of the Clean Development Mechanism (CDM) under the Kyoto Protocol in China. Heggelund has specialized in the Three Gorges Dam project on the Yangtze River in China, and completed her Ph.D. dissertation with a focus on the environment and resettlement politics for the dam in 2002. Heggelund, fluent in Chinese, has lived in China for a number of years, studied at Beijing University and worked in the United Nations Development Program (UNDP) Beijing office with responsibility for energy and environmental projects.

**Alan Meier** is Senior Scientist at the Lawrence Berkeley National Laboratory, United States. Dr. Meier earned degrees in chemistry, economics and a Ph.D. in energy and resources. Most of his research has dealt with understanding how energy is used and how it could be used more efficiently. His work relies heavily on field measurements of the energy use of buildings and equipment. About a decade ago, he began to study the energy consumption of "miscellaneous" equipment and, more recently, the energy use of appliances when they were switched off. This research sparked his interest in standby power and launched an unusually successful global effort to reduce standby power in all sorts of equipment. Dr. Meier has published over 100 papers and articles in journals, magazines and conference proceedings, mostly about energy efficiency. He founded the magazine, *Home Energy*, and served as Editor-in-Chief of the journal, *Energy and Buildings*. This book includes research undertaken while Dr. Meier was a Senior Energy Analyst at the International Energy Agency in Paris.

**Stephanie Ohshita** is Assistant Professor of Environmental Science and Management at the University of San Francisco (USF). Her research centers on energy-based solutions to multiple environmental problems—from local air pollution to global climate change—and combines engineering with tools from political economy and organizational theory. She has specialized in energy and environmental issues in Japan and China, examining cleaner energy technology cooperation between the two countries, as well as policy design and implementation. Prior to joining USF, Dr. Ohshita worked as a consultant to government and industry in the U.S. and Japan in the areas of air pollution, climate change, environmental risk assessment and environmental policy. She holds an SB in chemical engineering from MIT, a research certificate from Tokyo Institute of Technology, and an MS and Ph.D. in environmental engineering and policy from Stanford University.



**Jonathan Sinton** is China Program Manager at the International Energy Agency's Office of Non-Member Countries. Before joining the IEA, he was a long-time member of the China Energy Group at the Lawrence Berkeley National Laboratory, where he engaged in wide-ranging research on energy supply and demand policy—much of it in collaboration with colleagues in China—as well as compilation, evaluation, and analysis of energy and economic data. In addition to macro-level topics, he has also investigated energy use and associated environmental and health impacts at the firm and household levels. Dr. Sinton, a native of New York, earned a Bachelor's degree at Harvard College and a Doctorate at the University of California, Berkeley.

**Taishi Sugiyama** is the Leader of the Climate Policy Project at the Central Research Institute of Electric Power Industry (CRIEPI), Japan. He serves as a lead author of the IPCC Fourth Assessment Report. He serves as a member of the Future Framework Committee that made recommendations on a post-2012 framework to the Japanese government, as well as a member of the Market Mechanisms Committee of the Japanese government. He also served on the Small Scale Clean Development Mechanism (CDM) Panel of the CDM Executive Board and the Scientific Steering Committee of the International Human Dimension Program (IHDP)/Institutional Dimensions of Global Environmental Change (IDGEC).

**Stephen Wiel** is currently the President of the Board of the Collaborative Labeling and Standards Program (CLASP). He previously served as Head of the Energy Analysis Department at Lawrence Berkeley National Laboratory (LBNL), where he also established LBNL's Washington Office; led the greenhouse gas mitigation component of the U.S. Country Studies Program; served as senior advisor to the U.S. Department of Energy on integrated resource planning and demand-side management in the utility sector; and created the initiative on international energy efficiency standards and labels that evolved into CLASP. He currently serves on the Board of Directors of the American Council for an Energy Efficient Economy and two local organizations supporting homeless women. Steve has Bachelor's and Master's degrees in chemical engineering from Stanford University, and a Doctorate from the University of Pittsburgh, Graduate School of Public and International Affairs. He has published 151 books, articles, reports and papers on the subject of energy efficiency and the environment. He has served as a member of teams advising officials in Pakistan, the Philippines, Indonesia, Japan, China, Australia, Poland, Czechoslovakia, Romania, the Russian Federation and Mexico, and has otherwise traveled extensively in his work.

## Acronyms

APEC	Asia-Pacific Economic Cooperation
APP	Asia-Pacific Partnership on Clean Development and Climate (also known as AP6)
ASEAN	Association of Southeast Asian Nations
CDM	Clean Development Mechanism
CCP	Chinese Communist Party
CEO	Chief Executive Officer
CER	Certified Emission Reduction
CFL	compact fluorescent lamp
CLASP	Collaborative Labeling and Appliance Standards Program
COP	Conference of the Parties (of the UNFCCC)
ELI	Efficient Lighting Initiative
EMC	energy management company
ESCO	energy service company
FDI	foreign direct investment
GDP	gross domestic product
GEF	Global Environment Facility
GHGs	greenhouse gases
IFC	International Finance Corporation
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
LBNL	Lawrence Berkeley National Laboratory
METI	Ministry of Economy, Trade and Industry (Japan)
MOP	Meeting of the Parties (of the Kyoto Protocol)
NDRC	National Development and Reform Commission (China)
NGO	non-governmental organization
NPC	National People's Congress (China)
ODA	official development assistance
PePS	Promoting an Energy-efficient Public Sector
PRC	People's Republic of China
R&D	research and development
RD&D	research, development and demonstration
REEEP	Renewable Energy and Energy Efficiency Partnership
S&L	standards and labeling
SETC	State Economic and Trade Commission (China)
TWh	terawatt hours (billion kWh)
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization



## Executive Summary

The purpose of this book is to identify a promising modality of energy efficiency cooperation within East Asia.<sup>1</sup> Energy efficiency is of interest to all countries in the region, and a key pillar for climate change mitigation. In order to explore cooperation opportunities in greater detail, international research experts collaborated for one year. This book is the product of their collaboration.

**We reviewed existing energy efficiency policy and international cooperation in East Asia and found the following:**

1. All countries in East Asia already have some energy efficiency policies in place, and many have made great progress. But there still exists a large potential and an acute need for further energy efficiency improvement. Energy efficiency policies require ongoing adjustment and revitalization as technology advances. International cooperation can promote energy efficiency improvement and realize multiple benefits, including energy security, economic stability and environmental quality.
2. In terms of cooperation mechanisms, there is growing importance placed on *policy development cooperation* beyond policy dialogue to support host countries in creating a top-down push and incentives for energy efficiency improvement to leverage private and government financing.
3. In terms of the institutional structure of such cooperation, we observe a growing role for independent, *international networks* that facilitate the development of energy efficiency policies.
4. Concerning sectors targeted by cooperation, there is greater attention being paid to *more distributed targets* such as appliances, buildings and demand-side management. The industrial sector remains important, due to its large share of energy consumption. In industrial sector cooperation, we observe a trend from hard technology demonstration to soft and more comprehensive policy tools, including voluntary agreements and energy management systems.
5. Despite existing cooperation efforts, there are still massive opportunities for government intervention in energy efficiency improvement to accelerate the uptake of new, efficient technology. In contrast with the high-level political attention to energy efficiency improvement, energy efficiency agencies are chronically understaffed, underfinanced, and lack the capacity to develop and implement necessary energy efficiency policy.

---

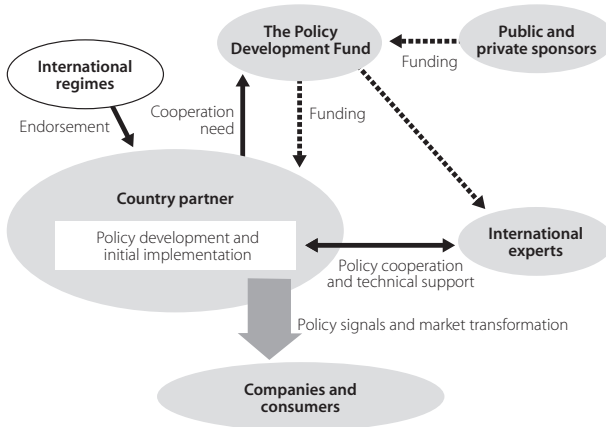
1 In this book we define East Asia as Japan, Korea and China with ASEAN countries.

6. While existing international organizations are financing several policy development activities, the resources have not been sufficient to support many worthwhile activities. In addition, host countries have frequently found the need for a quicker response than multilateral institutions can typically provide.

In sum, most governments understand that energy efficiency improvements have multiple benefits including energy security, economic efficiency, pollution reduction and climate change prevention. However, political attention and resource allocation have rarely been enough to consistently implement energy efficiency policies on the ground. Many countries lack dedicated institutions with the scientific expertise and industrial participation that are necessary to regularly update regulations and monitor compliance. In many countries, there is only a handful of staff in charge of energy efficiency policies. Thus there is a need to strengthen the energy efficiency institutions and to enhance their activities through international cooperation.

We propose a Policy Development Fund for East Asian Energy Efficiency Cooperation to address these needs (see Figure ES1).

Figure ES1.



The Fund is intended to:

- meet national priorities of participating countries;
- aim for massive energy savings and significant emissions reductions through market transformation and the leveraging of private sector resources; and
- commit to concrete actions and support policy mechanisms for such actions.

The major characteristics can be summarized as follows:

## 1. Political Agreement

*The Fund begins from a small number of countries and expands later.* It starts with a multilateral agreement from the outset to avoid capture by narrow interests, but the number of initial participants is kept small to emphasize areas of agreement and to achieve alignment of interests.

## 2. Design of the Fund

- *The fund is new and dedicated to energy efficiency.* A new and dedicated fund can respond more quickly, in contrast to lengthy project procedures required by international organizations established for other purposes, such as development aid.
- *The management structure (Chief Executive Officer, Executive Board, staff) is independent and professional* in order to insulate the entity from short-term political changes.
- *The activities are restricted to the region and to energy efficiency issues* in order to secure alignment of interests and effective management.
- *Like-minded countries in East Asia join the independent Fund.* Financial contributions are voluntary. Expected initial scale is US\$10 million annually. Private sponsors may also contribute.
- *The Fund supports the formulation and initial implementation of energy efficiency policy* in member countries. Recipients commit themselves to implementation.
- *Recipients, not donors, retain discretion* over types and stringency of policy measures.
- *CEO makes decisions*, including project selection, under guidance of Executive Board. CEO is nominated by the Executive Board.
- *Projects are selected by the CEO using cost effectiveness as a key criterion.* Cost effectiveness is defined as energy savings or CO<sub>2</sub> emission reductions per amount of grant.
- *The Fund supports new projects and provides co-financing* for existing efforts.

## 3. Projects

The Fund's potential target technologies and sectors are numerous, given the broad definition of the Fund—policy development for energy efficiency. Since nearly all sectors in developing countries need further policy development—including information gathering, law stipulation, standard setting, monitor-

ing, enforcement and revision—there is almost an infinite list of potential areas of cooperation. An indicative list of projects is provided in Table ES1. Four examples are provided in the main text to further illustrate how the Fund works.

The estimates of the cost to a government to institute and maintain an energy efficiency policy that induces cost-saving energy and emission reductions have been scarce so far, but some early estimates indicate that the costs are typically less than US\$0.10 per ton of carbon.

**Table ES1. Indicative list of target sectors under the Policy Development Fund.**

<b>Buildings Sector</b>
Efficient technology: e.g., CFL Initiative (lighting equipment)
Standby losses: e.g., set-top boxes, TVs, external power supplies
Building energy codes
Applications of cross-cutting approaches, e.g.: <ul style="list-style-type: none"> <li>–Appliance and equipment standards and labeling: e.g., CLASP</li> <li>–Tax and other incentives</li> </ul>
<b>Industrial Sector</b>
<i>Voluntary agreements with industry</i>
Energy management systems for system and process design assistance
Applications of cross-cutting approaches, e.g.: <ul style="list-style-type: none"> <li>–Industrial equipment standards</li> <li>–Tax and other incentives</li> </ul>
<b>Transportation Sector</b>
Applications of cross-cutting approaches, e.g.: <ul style="list-style-type: none"> <li>–Efficiency labels for tires</li> <li>–Vehicle fuel economy standards and labels</li> <li>–Tax and other incentives</li> </ul>
<b>Cross-cutting</b>
<i>Standards and labeling: e.g., CLASP</i>
Public-sector efficiency programs, including procurement: e.g., PEPS
Utility-based programs: demand-side management (DSM)
Energy service companies (ESCOs)
Incentives <ul style="list-style-type: none"> <li>–Credits for R&amp;D, manufacturing and purchasing</li> <li>–Equipment (catalog) and systems (design)</li> <li>–Tax reductions, accelerated depreciation, incentive payments and rebates</li> </ul>
Heat island mitigation

Note: The details for projects in *italics* are given in Chapter 6.

# **Part I**

## **Introduction**





The purpose of this book is to identify a promising modality of energy efficiency cooperation within East Asia.<sup>1</sup> Energy efficiency is of interest to all countries in the region, and a key pillar for climate change mitigation. In order to explore cooperation opportunities in greater detail, international research experts collaborated for one year. This book is the product of this collaboration.

On the international climate change front, cooperation on the dissemination of energy technologies has been raised as a possible supplement or alternative to the greenhouse gas emissions cap approach—represented by the Kyoto Protocol—to mitigate climate change. However, the discussions so far have been conceptual, and detailed design issues have been largely absent. In this project, we explore the potential for creating a regional agreement to foster the development and deployment of energy-efficient technologies.

The major outcome of our project is a concrete proposal for a Policy Development Fund dedicated to energy efficiency cooperation within East Asia. This proposal is designed to be practical and timely, such that government and industry should be able to implement it immediately. The proposal is based on a comprehensive analysis of energy efficiency cooperation within East Asia. Through our findings, we aim to convince readers that the Policy Development Fund is a vital step forward in achieving energy efficiency and reducing greenhouse gas emissions.

The new Fund would not necessarily diminish existing cooperative activities. Rather, the opposite is true. Our proposal builds upon the rich experiences of the past—and tries to create more of them in the future.

The rest of the book is structured as follows. Part I (Chapters 1 and 2) introduces the research effort behind the book and provides background on energy efficiency activities within individual East Asian countries. Part II (Chapters 3 through 5) provides analysis of existing international cooperation for energy efficiency in East Asia. Part III (Chapter 6) is the specific proposal of the Policy Development Fund.

---

1 The definition of East Asia varies across the literature. In the narrowest definition, it includes only Japan, Korea and China. A broader definition also includes ASEAN countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam) and some other neighboring countries such as India. In this book, we adopt the broad definition with a focus on Japan, Korea and China.



# Chapter 1

## Climate Change, Asian Economy, Energy and Policy

By Taishi Sugiyama

In this chapter, we describe three background issues. First, we share the context of international climate policy. Although the Kyoto Protocol has entered into force, the effectiveness and future prospects of the Protocol are uncertain; major innovation in international climate policy is needed. Second, we discuss how international relationships in East Asia are changing. The rapid growth of the region translates to a greater need for improvements in energy efficiency. Also, rapid change implies that the appropriate modality for international cooperation would change accordingly. Third, we would like to share the concepts of “policy development,” and international coordination or assistance to enhance policy development. Such coordination, sometimes referred to as harmonization, is sometimes misunderstood as intrusive and prescriptive, but it does not necessarily have to be so.

### 1.1 Global Climate Policy at a Crossroads

The Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC) is an important first step in the development of a truly global climate regime. Through the Kyoto Protocol, the climate regime covers a range of gases, as well as emissions from all economic sectors, leading to linkages of multilateral discussions on energy, transportation, forestry, agriculture, and broader issues related to trade and investment. Furthermore, after coming into force in 2005, the importance of Kyoto over the long term is not necessarily the designation of specific emission targets or the expansion of the number of Annex B Parties in the agreement, but that it has set the stage for international discussions regarding emissions.

That said, it must also be recognized that the regime will look markedly different from what was originally intended, mainly due to the decision of the U.S. to opt out. Moreover, there is no indication that the U.S. is willing to return to the Kyoto fold anytime soon. For future negotiations, views are sharply divided between, and among, developed and developing countries on how best to share the burden of achieving targets. While the Kyoto Protocol calls for another negotiation round beginning from 2005 to set further targets beyond 2012, countries may consider developing alternatives to the current framework, particularly if the world’s largest emitters refuse to re-engage in the Kyoto process.

Against this backdrop, a distinct opportunity lies in international cooperation on energy efficiency. If we can successfully reframe the climate issue as the promotion of energy efficiency, there may be more chances for countries to mobi-

lize a large amount of resources towards preventing climate change. While the emission cap is a divisive approach, as observed in the UNFCCC negotiation, there are strong common interests and a consensus to promote energy efficiency in most countries. The current U.S. administration, for example, has made it clear that it will emphasize energy-efficient technology, and has initiated a number of voluntary, technology-centered bilateral and multilateral partnerships including the Asia-Pacific Partnership on Clean Development and Climate (APP).

In a much broader context, Sugiyama, Ueno and Sinton (2005) developed a scenario in which nations sign mutually-beneficial treaties with regional or like-minded partners that guide their cooperation on climate technologies. Their technological choices, however, may differ depending on their respective resource endowments and individual political concerns, such as national security. Examples include cooperation on energy conservation among China, Japan and other Asian countries; geological carbon storage among major fossil-fuel producers such as the U.S., Canada, Norway, Australia, Russia and Saudi Arabia; and wind power among EU nations and other countries. Once technologies are developed in niche markets and their costs are brought down, they have the potential to diffuse to the rest of world through the international interplay of technologies and institutions. A complementary global framework may play a role in legitimizing these activities; in letting them become aware of each other; in maintaining high political salience; and, potentially, in linking them to climate-related commitments.

A distinctive feature of the paper is that nations typically put emphasis on niche market creations and market transformations (deployment activities), rather than on the basic RD&D projects that have been popular, and which have been most closely associated with the term “technology cooperation.” There are certain areas where basic RD&D works, but they do not represent the full range of possible technology cooperation. The creation of international niche markets for the development of nascent technologies for renewable energy, carbon sequestration and cutting-edge energy-conservation technologies (e.g., hybrid cars and heat pumps) could lead to rapid technological change. For energy conservation in transportation and residential sectors, transforming markets by implementing energy efficiency standards and labeling programs has proven to be effective.

A political debate had been initiated in Japan prior to international negotiations in 2005. Japanese views, like any other country’s, are divided—there are optimists as well as pessimists on the matter of continuing with a Kyoto-style binding cap regime. However, there seems to be a broad consensus that the binding cap approach is not very promising for developing countries in the near future, and that the CDM is not going to be a major driver for massive energy savings and CO<sub>2</sub> reductions in developing countries. The Industrial Structure Council, for which METI serves as the secretariat, published a report

on technology cooperation and sectoral approaches—with an emphasis on energy efficiency—but the details are still to be determined.

It should be noted that this book’s proposal is flexible vis-a-vis the overarching regime. This means that our research findings, and the proposal itself, can be housed either with the UNFCCC/Kyoto Protocol regime, APP or other regimes, as long as key conditions—of which being cooperative rather than coercive is crucial—are met. This will be discussed further in Chapter 6.

## **1.2 Changing International Relationships in Asia: Economic Development, International Cooperation and Technology Transfer**

East Asia has been the growth center of the world for a couple of decades already, with national circumstances and cooperation priorities changing over time. There have been large amounts of ODA flows to the region but they are currently in decline. Demonstration projects of new technologies funded by donor countries have been highly effective in training engineers in the recipient countries in the past. However, these activities are getting dwarfed by private activities including FDI, joint ventures and domestic enterprises. As the economies “take off,” some international cooperation activities are becoming outdated. Still, there is high potential for energy efficiency improvements that do not prohibit economic benefits. The challenge for policy-makers is to identify an effective mode of international cooperation, given such significant changes in national conditions.

The term “technology transfer” is prominent in such policy debates, but this term is often a source of confusion. Defining the term serves to clarify the perspective of our work in this book. There are two ways to define “technology transfer”:

- A. *Narrow definition:* an action by which developed countries provide technology (hardware equipment, intellectual property rights, etc.) to developing countries at no or low cost.
- B. *Broad definition:* a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change among different stakeholders (IPCC 2000).

The latter definition is rather broad. The term “transfer” is defined to “encompass diffusion of technologies and technology cooperation across and within countries.” Further, it “comprises the process of learning to understand, utilize and replicate the technology, including the capacity to choose and adapt to local conditions and integrate it with indigenous technologies” (IPCC 2000). In this definition, there are many roles for governments to create an “enabling environment” for technology transfer including education, training, infrastructure development, policy development, law enforcement and so forth.

While the broad definition (B) captures the meaning of technology transfer better than the narrow one (A), and is frequently used in scientific literature including IPCC, we must be careful that the narrow definition is neither consciously nor unconsciously adopted by the large majority of engineers and policy-makers when we communicate with these audiences. To avoid confusion in this text, we carefully distinguish between the two definitions.

The potential for technology transfer is limited in its narrow definition (A). However, there are a lot of opportunities and mutual benefits for technology transfer as defined by its broad definition (B). In other words, if a country is asked to pass on certain technologies for free, the volume of potential activities would be limited. However, if countries cooperate to create an appropriate “enabling environment” for the diffusion of energy efficiency technologies, the implications of such a coordination system could be substantial.

### **1.3 Policy Development and Regulatory Harmonization: Opportunities**

To some extent, energy efficiency improvements take place without policy intervention in order to save energy costs. However, there is evidence that efficiency improvements will not happen without a policy to support them. In other words, energy efficiency improvements will not happen quickly without top-down policies. This is different from traditional energy development aid that goes to specific infrastructure developments.

Despite relatively high energy prices since the 1970s, many energy (and cost) saving opportunities have remained untapped. Even investment opportunities with a short pay-back time of less than two years are not undertaken because of many barriers to energy efficiency investments. As one example of these barriers, macroeconomic conditions may not allow financing for energy efficiency improvement. Other barriers include: distorted or incomplete price signals; lack of accessible information for facility owners; lifestyle behavior and consumption patterns; and lack of attention to energy efficiency in conventional methods of policy development.<sup>2</sup> Policies are often necessary to overcome these barriers, and that is why there are various energy efficiency policies implemented in all countries on top of energy pricing policy. Policy tools include: information sharing; standards and labeling of energy efficiency performance for appliances, automobiles and boilers; voluntary agreements; and so forth.

International coordination of such domestic policies is generally beneficial to individual countries for two reasons. First, individual domestic policies are stable with legitimization at the international level. Second, countries can learn lessons from each other regarding institutional designs, implementation practice, success stories and failures. For example, a small and less-developed country can benefit from joining internationally coordinated efforts by

---

2 For comprehensive discussions of barriers to energy efficiency improvement, see IPCC 2001 p348.

adopting an internationally established regulatory system with minor modifications to adapt it to the local context.

The last example is sometimes referred to as “regulatory harmonization.” A problem here is that the term “regulatory harmonization,” like “technology transfer,” can mean different things to different people, and it may be misinterpreted and sound intrusive. For some, harmonization has a legal meaning, which implies that countries will be forced to follow the same procedures. The authors are of the view that harmonization is not a threatening process, but that it refers to internationally coordinated efforts to promote energy efficiency policy. Internationally coordinated efforts might include the adoption of the same test procedure, energy efficiency performance standard or regulatory framework. National participation in such efforts are voluntary by nature.

Countries’ willingness or reluctance depends on the level of harmonization among historical, political, economic and climatic characteristics. For globally-traded equipment such as computers, willingness is high by all countries as evidenced by the widespread use of the Energy Star labeling system. For equipment whose specifications are dependent on lifestyle and climate, such as refrigerators and cooking heaters, the willingness is generally low. Even in the latter case, governments in Asian developing countries, whose national markets and administrative capacities are limited, recognize the merits of saving regulatory costs and promoting international trade by adopting international standards with appropriate modifications. Alignment with international standards, including identification of appropriate levels of harmonization for each nation, is on the agenda for all countries and the authors are of the view that there is neither a single front-runner nor a notable laggard.





# Chapter 2

## The Need for Energy Efficiency Cooperation

By Taishi Sugiyama, Gørild Heggelund and Takahiro Ueno

This chapter explains why more cooperation is needed on energy efficiency and conservation. Energy efficiency is key to achieving sustainable development in East Asia and offers multiple benefits, including: energy security; economic efficiency; and mitigation of local and global environmental problems, including climate change. There has been increasing political attention paid to energy efficiency and conservation, with many new policies implemented in the region. International cooperation enhances domestic policy, promotes energy efficiency and serves as an institutional vehicle to go beyond the political stalemate of recent international climate policy.

### 2.1 What Energy Efficiency Can Do for East Asia – and the Planet

The oil supply shock in 1973 was the first political event that forced policy leaders worldwide to become aware of the importance of—and opportunities for—energy efficiency policy. Energy security and competition in international trade served as the major drivers for launching energy efficiency policies in many countries. Serious policies were designed and implemented in developed countries and then more gradually in developing countries. While the modality and seriousness of policies differ across countries, there have been many lessons learned and we can point to many successful energy-reducing policies.

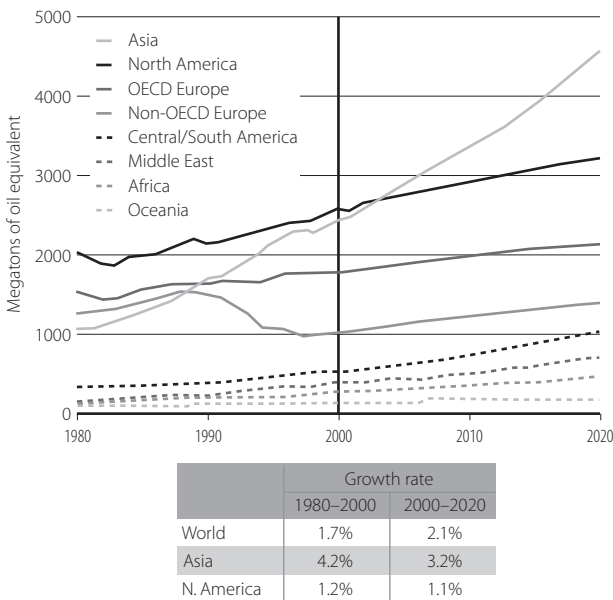
In the late 1990s, climate change emerged as another key driver for improving energy efficiency. In previous decades, energy conservation policy was not stable in many countries. Policies were introduced when oil prices were high, but they were pulled back when prices dropped. However, the climate change issue emerged as another, stable policy driver since the adoption of the Kyoto Protocol of the United Nations Framework Convention on Climate Change in 1997. As the deadline for developed countries to cut greenhouse gas emissions nears (2008–2012), there is greater recognition that improving energy efficiency is a major objective for achieving CO<sub>2</sub> emission cuts.

Energy efficiency is particularly important in East Asia where economies and energy demand are growing rapidly. Asia has been the growth center of the world economy and energy consumption in the last two decades, and energy consumption may grow even faster in the coming two decades (Figure 2.1). This energy growth suggests that there will be a significant increase in CO<sub>2</sub> emissions, given the region's high dependence on coal, particularly in China and India (Figure 2.2).

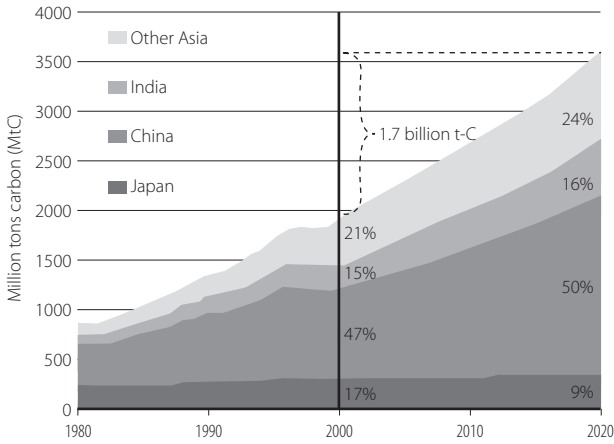
It is known that there is great potential for reducing energy consumption and CO<sub>2</sub> emissions through accelerated energy efficiency policies. In China alone, fuel economy standards for automobiles are expected to reduce oil consumption by 1.14 billion barrels while reducing carbon emissions by 121 million tons (or 443 million tons of CO<sub>2</sub>) in 2030 (Figure 2.3). Standards and labels to promote energy-efficient refrigerators can reduce electricity use by 117 TWh and reduce CO<sub>2</sub> emissions by 97.6 million tons by 2030 in four Asian countries: China, India, Japan and Korea (Figure 2.4). Ninety-five to 110 million tons of CO<sub>2</sub> emissions in the iron and steel sector and 330 to 380 million tons of CO<sub>2</sub> emissions in the cement sector can be cut by 2030 by using the best available technologies today (Tanaka *et al.*, 2006).

There is potential for intensive policy implementation on energy efficiency to slow the expansion of the primary energy supply. This will reduce the financial burden for the infrastructure development, the geopolitical tension over overseas supply sources, and CO<sub>2</sub> emission sources. It's important to note that energy infrastructure can last as long as several decades. Also noteworthy is that carbon-free supply technologies, including nuclear, renewable, and carbon capture and storage (CCS) technologies for fossil fuel facilities are still in limited use globally. Therefore, it is critical to buy time by implementing energy efficiency policies and avoiding the expansion of highly carbon-intensive infrastructure, until the carbon-free technologies are well-developed, affordable and available to East Asian countries in the coming decades.

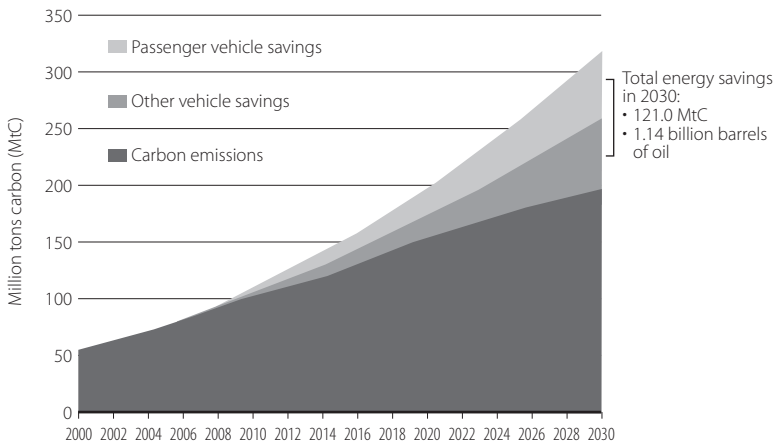
**Figure 2.1. Global and Asian energy consumption – history and outlook (IEEJ 2004).**



**Figure 2.2. Asian CO<sub>2</sub> emissions from the energy sector – history and outlook (IEEJ 2004).**

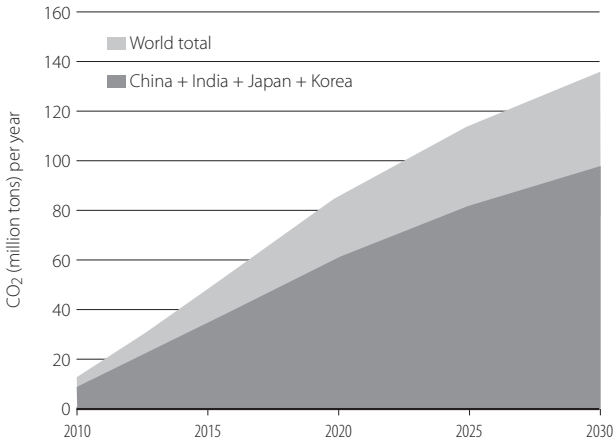


**Figure 2.3. Potential carbon savings from fuel economy standards in China.**



Source: The Energy Foundation.

**Figure 2.4. Potential energy savings by efficiency standards and labels for refrigerators.**



Source: CLASP (<http://www.clasponline.org>).

## 2.2 Domestic Political Context of Energy Conservation – Increasing Political Attention

East Asian countries have already become aware of the importance of energy efficiency and have begun taking action. In this section, our primary focus is on China.

### A. China’s current energy policy and political setting

China’s dependency on coal as its primary energy source (67.7 per cent of total energy consumption, China Statistical Yearbook, 2005) has made energy efficiency an increasingly important component of China’s current energy policy. With 114 billion tons of known coal reserves (IEA, 2004), China will continue to be dependent upon coal for the foreseeable future, and by 2030, coal is expected to constitute 53 per cent<sup>1</sup> of total energy consumption. China announced in 2001 plans to quadruple its GDP before 2020, while only doubling its energy consumption. This objective provides serious challenges for China as energy consumption increases.

#### Policy and legal system

Energy conservation has been an important element of the political agenda in China for over two decades, and the focus on energy efficiency has yielded

<sup>1</sup> Under the Reference Scenario of the IEA (2004), by 2030 China and India will account for 48 per cent of global coal demand.

results. From 1980 to 2000, China's energy only doubled, while its GDP quadrupled (NESP, 2005; Sinton *et al.*, 2005). China's GDP increased by 9.7 per cent during the period, while the average energy intensity rose by 4.6 per cent. About 1,260 Mtce was saved between 1981 and 2002 while China's goal of supplying enough energy to sustain economic growth was still met.

China's Ninth Five-Year Plan for Social and Economic Development (1996–2000) suggested for the first time explicit and detailed energy strategy, making energy saving a priority. During that period, China's Energy Conservation Law entered into force (on January 1, 1998).<sup>2</sup> The 10th Five-Year Plan for Social and Economic Development (2001–2005) placed energy conservation at the top of the energy policy agenda. Improving energy efficiency and spreading energy-saving technologies were two of the Plan's main energy policy objectives. Diversification of China's energy mix and development of new sources of energy and renewable energies were also identified. The 10th Five-Year Plan for Energy Conservation and Comprehensive Resource Utilization, a key document attached to the 10th Five-Year Plan, set specific goals for energy conservation. Another important policy document that illustrates the increasing political attention paid to the energy issue by China's leadership, including energy efficiency, is the China Medium- and Long-Term Energy Conservation Plan (2004–2020) issued by the National Development and Reform Commission (NDRC). The Plan stresses China's enormous potential to save energy.

There have been several recent signs that China's leadership feels the urgency of the current energy situation and the need to slow down energy consumption. During the National People's Congress (NPC) in March 2006, energy efficiency was emphasized as a key measure of economic growth by Premier Wen Jiabao who proposed a four per cent reduction in energy intensity for 2006 in his report. Energy intensity is energy consumption per unit of gross domestic product (GDP). From 2006, the energy consumption per unit of output for all regions and major industries will be made public on an annual basis. Moreover, the 11th Five-Year Social and Economic Development Program<sup>3</sup> was recently issued and names improved energy efficiency as a major objective; the goal is to reduce the ratio of total energy use to GDP by 20 per cent in 2010 compared to 2005. Also, a high-level task force has been set up to draft a law on energy (with representatives from a number of ministries). In a rare move, the government has called on the public to provide input to the drafting of the new energy law.

---

2 Other energy-related laws are the Electric Power Law (1996); the Coal Industry Law (1996); the Cleaner Production Promotion Law (2002); and the Renewable Energy Law (2005) that went into effect in January 2006. In addition, there are numerous regulations to direct and standardize energy conservation work (see PRC 2004 chapter four for a list of laws, policies and regulations).

3 The Five-Year Plan (*jihua*) is now called the Five-Year Program (*guihua*), implying that the targets should be considered more as guidance than as mandatory goals.

In the state media, Chinese leaders have expressed their concern with the current energy situation, illustrating the increased attention being paid to the energy issue.<sup>4</sup> In addition to the domestic pollution problems and energy security issues related to energy consumption, China's growing GHG emissions deeply trouble China's leaders and the issue has been addressed in the state media (see China Climate Change Info Net, 2004). A heightened awareness among China's leaders that energy shortages and pollution problems limit economic growth is another reason for the emerging focus on energy efficiency.

Policy measures and initiatives have been carried out to achieve energy efficiency in China. Efforts by the government to increase overall energy efficiency have included: the reduction of coal and petroleum subsidies; investments to improve energy efficiency; and China has "drafted and implemented a series of incentive policies in terms of finance, credit and taxation toward energy conservation projects including interest payment rebates, differential interest rates, revoking of import taxes and reduction of income tax, etc." (PRC 2004, Chapter 4). Several priority projects that concern development of technologies and equipment for clean energy programs were targeted under the 10th Five-Year Plan such as the 863 Program, and the National Key Technologies R&D Program. Policy studies have been issued, such as China's National Comprehensive Energy Strategy and Policy by the Development Research Center of the State Council in 2005. Efforts have been carried out to increase awareness in the industrial sector and projects have been implemented such as the development of Energy Saving Companies (ESCO) and Energy Management Companies (EMC) with GEF grants, and loans from the World Bank and the Chinese government. Also, programs for Voluntary Energy Efficiency Agreements for Iron & Steel plants (in Shandong province, for example) that increase their efficiency efforts have been carried out with foreign assistance. The Efficient Lighting Initiative (ELI) is another initiative that has been adopted by China to increase efficiency (see Chapter 5 on the ELI). The ongoing efforts to introduce standards and labeling for electrical appliances have yielded dramatic results in China (see Chapter 4 for Collaborative Labeling and Appliance Standards Program (CLASP) efforts in China).

The Ministry of Construction introduced a pilot program on energy conservation in buildings, and in 2006 more stringent energy codes for new buildings were introduced aimed at cutting energy consumption by two-thirds. Beijing and Shanghai will be experimental cities and the rest of the country is expected to follow by 2010 (Xu, 2005).

While ongoing efforts have been effective, the potential for energy efficiency in China is still large. Chinese industries are typically less energy efficient than

---

4 One example is General Secretary of the Chinese Communist Party (CCP) Hu Jintao's speech about the energy situation in China on June 28, 2005, (Xin Langwang), where energy efficiency was highlighted as one of the areas requiring focus.

their counterparts in other countries. Energy efficiency potential in the industrial sector is large as energy intensity is still higher on average (about 40–50 per cent) in China than in Western industrialized countries. Moreover, coal consumption is rising after declining in the late 1990s. Energy shortages and growing domestic air pollution problems are major reasons for the recent urgency to increase energy efficiency. China's reaction to the power shortages (which occurred in 24 out of 31 provinces in 2004) has been to construct new power plants, with 66 GW built in 2005 alone, and over 70 GW planned to come online in 2006. The energy savings potential from developing more efficient electrical appliances (TVs, refrigerators and lighting) is large and could save 10 per cent of all residential energy by 2010 (Ogden, 2006). Energy codes for buildings have been introduced, but the effective implementation of these codes has been slow as less than five per cent of constructed urban buildings comply with the design codes of building energy conservation (NDRC, 2005).

Some of the areas of potential improvement are energy structure, technology and management. In addition, low managerial capacity, the lack of efficient implementation of existing laws and outdated equipment—combined with increasing energy demand—emphasize the need for focusing on energy efficiency. Lack of funding is another issue. In 2004, China spent 424 billion Yuan on energy supply compared to 23 billion on energy conservation (LBNL, 2005).

### Institutions

Recently, the increased focus on energy challenges in China has resulted in the establishment of new energy authorities. On the institutional side, China has varied the centralized governmental energy authorities over the years. The Energy Bureau in the NDRC has had the primary responsibility for China's energy industry since 2003 when institutional changes took place. The then State Development and Planning Commission (SDPC) was renamed the National Development and Reform Commission (NDRC). The State Economic and Trade Commission (SETC) that was responsible for energy-related matters was abolished, and the NDRC took over many of the responsibilities. The Energy Bureau of the NDRC became responsible for energy supply, while energy consumption and efficiency belong to a division of the environment department (Department of Environment and Resources Conservation). In the same year, the State Electricity Regulatory Commission was also established. After several years of growth, it remains weak, with the key functions of setting electricity rates and approving projects remaining with NDRC's Pricing Department and Energy Bureau respectively. The State Administration for Quality Supervision, Inspection and Quarantine, is responsible for setting standards of all sorts, including efficiency standards for appliances and lighting equipment.

Further institutional changes include the establishment of the Office of the National Energy Leading Group in 2005, which is an office at the ministerial



level led by Ma Kai, the NDRC minister. The office is in charge of overall energy strategy, but its actual functions are unclear. The office serves the National Energy Leading Group, a high-level task force led by Premier Wen Jiabao (and vice premiers Huang Ju and Zeng Peiyan) that meets annually.<sup>5</sup> It is still unclear what the results of these institutional changes will be and whether they will strengthen energy policy-making and coordination. Some believe that the National Energy Leading Group may be a forerunner to the establishment of a new Ministry of Energy, and they advocate for the establishment of such a ministry with a clear mandate and the authority to achieve efficient implementation of energy policy.

Based on the study of developments in China's energy policy, supplemented by interviews and a workshop in Beijing, it is clear that the political climate for action on energy efficiency is favorable and the political will to cooperate is there.

## **B. Current energy efficiency policies in East Asia**

China is not the only country that has addressed energy efficiency policy seriously. Almost all East Asian countries have adopted and implemented policies aimed at energy efficiency in recent decades. This section discusses the current realities.

### Typology of policies

There is a variety of policies for energy efficiency. They differ across sectors and national conditions. A typology of policies includes the following:

- information sharing (on policy design, technologies, etc.);
- setting energy conservation goals;
- setting technology dissemination goals;
- reporting programs;
- training and education;
- setting minimum energy performance standards on energy-efficient technologies including appliances, equipment, lighting products, industrial processes, whole buildings and automobiles;
- labeling programs for technologies;
- “top-runner” or “best available technology” programs;
- voluntary (or negotiated) agreements, especially in the industrial sector;

---

5 Other members of the Leading Group include NDRC Minister Ma Kai, Foreign Minister Li Zhaoxing, Finance Minister Jin Renqing and Commerce Minister Bo Xilai.

- energy manager system;
- technology research, development and demonstration;
- support for Energy Saving Companies (ESCOs) or Energy Management Companies (EMCs);
- governmental procurement of efficient technologies;
- financial incentives:
  - favorable lending terms for investments;
  - special loan funds dedicated to energy efficiency;
  - tax incentives for investments in energy-efficient technologies; and
  - rebates for highly efficient products;
- recognition and awards for enterprises, agencies and individuals;
- fines, fees and other punitive measures for non-compliance or as a disincentive;
- support for technological research, development and demonstration; and
- education on energy efficiency for all players.

While many of them are already well-known, it might be helpful to add some explanations and examples. *Efficiency standards* are either mandatory or voluntary and they aim at transforming the technology market by eliminating products that do not meet efficiency standards. *Labeling* is a communication method of sharing efficiency information with consumers in order to encourage the production of more efficient equipment. *Voluntary agreements* are the agreements between the business sector and the government to engage in energy efficiency programs. There is a wide variety of voluntary agreements. One example is endorsement labeling programs such as ENERGY STAR. Another example is negotiated agreements between government and private companies to improve energy efficiency. The *energy manager system* is a system that mandates companies to designate energy managers in charge of energy efficiency improvement at their factories. Energy managers are required to have expertise and training and must regularly report on energy consumption. *Governmental procurement* is a governmental activity designed to procure energy-efficient products in order to build demand for cutting-edge, energy-efficient technologies.

### Institutions, policies to date

Tables 2.1 through 2.9 summarize the current status of energy efficiency policy and institutions in East Asian countries. In most countries, there are dedicated energy ministries and/or agencies present (Table 2.1). Also, most countries have energy conservation laws and/or long-term plans to guide their individ-

ual energy efficiency policies (Table 2.2). While there are energy efficiency standards and labels for refrigerators and air conditioners in most countries, many countries lack standards and labels for washing machines (Table 2.3) and dozens of other energy-consuming products. Half of the countries lack energy efficiency standards (often called codes) for dwellings, although most countries have them for public and commercial buildings (Table 2.4). Countries also differ with respect to having other policies and energy reduction measures such as “reporting, energy manager, and energy saving plan” requirements (Table 2.5); fiscal measures (Table 2.6); economic incentives (Table 2.7); energy audits (Table 2.8); and voluntary agreements (Table 2.9).

The terms that capture attention here are: *progress*, *diversity*, *convergence* and *opportunity*. First of all, there has already been *progress* in developing institutions in all countries. This serves as a firm basis for further improving energy efficiency. There is no need to start this process from scratch, and any isolated efforts without taking region-wide progress into account would be futile. *Diversity* is an obvious concept, even at this superficial level of summary. The types of policies adopted differ across countries. This implies that steady progress within individual sectors of an individual country, in harmony with individual energy efficiency regimes that reflect the priorities and history of that country, is far more important than seeking a “one-size-fits-all” solution that would aim to address all countries and sectors simultaneously. On the other hand, *convergence* is observed when the set of policies is seen from a wider perspective. This means that no country will adopt a completely different set of policies from the rest of the world to address energy efficiency. Countries have similar sets of policies in general, with many differences in details. This implies two things. First of all, there are policies that have generally proven, or at least are perceived to be proven, to be effective in meeting the goals. Second, there is a wide range of *opportunities* for international cooperation. Countries are promoting similar policies to meet similar goals. This means that there are many resources to be shared among the involved nations, including intellectual knowledge, practical lessons of successes and failures, personnel resources that embody them, and enthusiasm and shared values toward more energy efficiency.

An immediate caveat to the tables is the shallowness of the summary. In particular, differences in *ambitiousness* and *legal systems* are lacking. *Ambitiousness* of standards and labeling differs across countries. In some countries standards are set at an ambitious level so that only cutting-edge energy efficiency equipment is able to survive in the market. In some other countries, however, the level of standards is low, reflecting the capacity of domestic manufacturers and people’s willingness to pay for up-front costs.<sup>6</sup>

---

6 While energy efficiency programs save costs for consumers in most cases, people often make the decision to purchase equipment based on up-front costs only.

*Legal systems* also differ across countries. In Japan, if laws and standards are stipulated, compliance with them usually follows without harsh enforcement in many cases. Publicizing the non-compliance is seen by companies as a very heavy penalty. In many other countries, however, laws and standards are seen as meaningless without the presence of strong enforcement and heavy penalties, such as fines or imprisonment. Japan used voluntary agreements and non-mandatory requirements as the major instruments on every front of environmental policy, of which pollution control agreement and top-runner systems for appliance standards are most famous, and have succeeded in controlling the environmental quality to some extent. It is an interesting lesson, but applying it to the rest of world may not be appropriate. This is not to say that one country is better or worse than another, but the differences in their legal systems must be recognized. This, therefore, suggests that fine-tuned, perhaps different, legal approaches in promoting energy efficiency in individual countries are needed.<sup>7</sup>

**Table 2.1. Institutions in charge of implementing energy efficiency programs.**

	National energy efficiency agency (Existence/name)	Regional/local agencies (Existence/number)
Australia	No	• (2) ◦ (3)
China	◦	
Hong Kong, China	◦	
India	• (BEE)	•
Indonesia	◦	
Japan	•*	• (9)
Korea	• (KEMCO)	
Malaysia	• (PTM)	
Philippines	◦	◦ (2)
Taiwan, China	◦	
Thailand	• (DEDE)	• (5)
Vietnam	• (VECP)	• (6)

• National agency; ◦ Ministry department rather than separate agency.

\* Agency covering energy efficiency and supply.

Source: WEC 2004

**Table 2.2. Existence of national energy efficiency programs.**

Australia	Safeguarding the future 1998–2004: Constrain emissions growth to eight per cent above 1990 levels
China	National Energy Conservation Project 2001–2005 Medium- to Long-term Energy Conservation Plan
Hong Kong, China	Nothing
India	Energy Conservation Law

7 For a comprehensive discussion of differences in the national legal systems and their impact on environmental and other political goals, see Kagan and Axelrad (2000), for example.

## Cooperative Climate: Energy Efficiency Action in East Asia

Indonesia	Energy Conservation Program 2003–2010: Reduction of the energy intensity of one per cent per year
Japan	Energy Conservation Law
Korea	Second Energy Rationalization Energy Plan 1999–20003 (10 per cent saving in 2003)
Malaysia	Malaysian Industrial Energy Efficiency Improvement Program 2000–2004 (10 per cent saving)
Philippines	Energy Conservation and Efficiency Program 2000–2001; Promotion of Energy Efficient Use Law (2000)
Taiwan, China	Energy Efficiency and Conservation Program: 28 per cent reduction in the energy intensity of the GDP by 2020 (16 per cent in 2010)
Thailand	?
Vietnam	Vietnam Energy Conservation Program 2003–2005

Source: WEC 2004

**Table 2.3. Energy standards and labels for household electrical appliances.**

	Refrigerators	Washing machines	Air conditioners
Australia	M (1999, 2005)	L	M (2001/04/07)
China	L (2004), M (1989/2000)	M (1989)	M (1989/2001)
Hong Kong, China	No	No	No
India	P (2005)	No	No
Indonesia	P (2005)	No	No
Japan	M (1999)		M (1999)
Korea	L, M (1002)	L, M (2001)	L, M (1993)
Malaysia	No	No	No
Philippines	M (2000)		M (1993/2002)
Taiwan, China	M (2000)		M (2002)
Thailand	L, M (2004)		L, M (2004)
Vietnam	P	P	P

L: Mandatory labels; M: Mandatory efficiency standards, V: Voluntary standards, P: Under preparation.

Source: WEC 2004

**Table 2.4. Thermal energy efficiency standards for new buildings.**

	Dwellings			Buildings		
	Year	Status	Savings	Year	Status	Savings
Australia	2003	P		2003	P	
China	1995	M		1995	M	
Hong Kong, China		No		1995	M	
India		No		2001	P	
Indonesia		No		2000	V	
Japan	1999	M		1999	M	
Korea	1994	M		2001	M	10%
Malaysia		No		2001	P, V	
Philippines		No		1994	M	
Taiwan, China	1995–2002	M	20%	1995–2002	M	5–10%
Vietnam		P			P	

M: Mandatory; P: Planned; V: Voluntary.

Savings: consumption reduction compared to buildings built before the enforcement of the standards.

Source: WEC 2004

**Table 2.5. Other regulations.**

	Mandatory consumption reporting	Mandatory energy managers	Mandatory energy saving plan	Mandatory maintenance
Australia				
China				
Hong Kong, China				
India				
Indonesia	S	I	Yes*	
Japan**	I, S	I, S	I, S	
Korea	I, S		I, S, U	
Malaysia				
Philippines	I, T, S	I	I, T, H, S	
Taiwan, China	I, T, H, S	I, T, H, S	I, T, H, S	
Thailand			Yes	
Vietnam				

I: Industry; S: Services; H: Households; T: Transport; Empty cell: No measure.

\* Objective of 320 MW; by October 2002, power saving of 7 MW; target of 150 MW for 2003.

\*\* Factories which consume large amounts of fuel or electricity (more than 3,000 kl of fuel per year in crude oil equivalent or more than 12 GWh of electric power per year) are subject to the mandatory requirement.

Source: WEC 2004

**Table 2.6. Fiscal measures.**

	Tax credit or tax reduction	Accelerate depreciation	Tax reduction
Australia			
China			
Hong Kong, China			
India			
Indonesia			
Japan	I, S, H	I	
Korea	I, S, H, T		I, S, H
Malaysia	I	I	I, S
Philippines			
Taiwan, China	I, S		
Thailand			I
Vietnam			

I: Industry; S: Services; H: Households; T: Transport; Empty cell: No measure.

Source: WEC 2004

**Table 2.7. Economic incentives, by sector.**

	Investment subsidies	Soft loans	Energy efficiency funds (type/budget)	ESCO (number/turnover)
Australia			Various funds*	(60–70)
China				
Hong Kong, China				
India				
Indonesia				

## Cooperative Climate: Energy Efficiency Action in East Asia

	Investment subsidies	Soft loans	Energy efficiency funds (type/budget)	ESCO (number/ turnover)
Japan	I, S, H			(144) (127M\$)
Korea		I, S, H, T		(163) (108 M\$)
Malaysia		I	(2.1 M\$/yr)	(4) (2.1 M\$)
Philippines		I		(6)
Taiwan, China	I, S, H			(9)
Thailand	I, S, H	H	ENCON fund	(8)
Vietnam			(3 M\$/yr)	(4) (2 M\$)

I: Industry; S: Services; H: Households; T: Transport; Empty cell: No measure.

\* In Australia there are six programs with a total public budget of 25.6 M\$/year (US\$14 M).

Source: WEC 2004

**Table 2.8. Audits.**

	Dwellings	Buildings	Industry
Australia		S	S (Victoria EPA only)
China			
Hong Kong, China		S (154)	
India			
Indonesia		F, S	F, S
Japan		F (177)	F (200)
Korea		F, S (419)	F, S (1750)
Malaysia		F	F
Philippines		(525) (1979- )	Yes
Taiwan, China		F, M	F, M
Thailand		M, S (< 30%)	S (< 30%)
Vietnam			S

M: Mandatory; F: Free for the consumers (i.e., 100 per cent subsidized); S: Partly subsidized.

Source: WEC 2004

**Table 2.9. Voluntary agreements to reduce energy consumption and/or CO<sub>2</sub> emissions.**

Australia	• (variety of programs with voluntary commitments)
China	• (two steel companies)
Hong Kong, China	No
India	No
Indonesia	No
Japan	• (1) (industry federation)
Korea	• (industry and building)
Malaysia	• (14) (four with industry associations and 10 with industrial companies)
Philippines	•
Taiwan, China	• (5) (with industry associations)*
Thailand	
Vietnam	• (1) (textile industry)

\* Iron and steel, chemicals, cement, pulp and paper, and man-made fibers; period 1997–2002; target of 1.9 MGloe savings (about 1.7 Mtoe).

Source: WEC 2004

### C. Why domestic policies are the key to promoting energy efficiency

Most energy efficiency improvement investments are economically beneficial since the reduced energy costs usually overcompensate for the upfront investment. This is why many people assume that energy efficiency improvement activities simply happen without government support. In reality, however, there are many barriers for energy efficiency improvement (IPCC, 2001, Chapter 5). These include, among others, unstable, distorted or incomplete prices; a lack of information; lifestyle and behavioral influences; and consumption patterns.

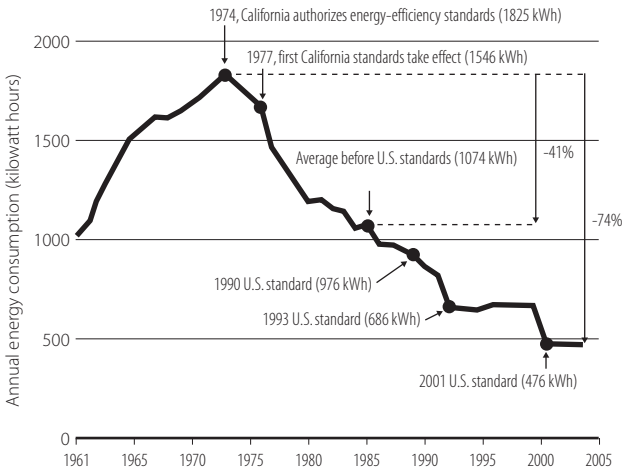
For example, imagine you are buying a refrigerator and there are two options: one with a high price and high energy efficiency; the other with a low price and low energy efficiency. If your electricity is heavily subsidized and does not reflect real energy costs, then you will not buy the one with high efficiency. This is the barrier to energy efficiency called *distorted or incomplete prices*. If there is no information available to show the difference in energy efficiency, you will not choose the one with high efficiency. This is the barrier called *lack of information*. You may simply not care how much energy is used and will base your choice on color, design, performance or, perhaps, the marketing campaign. This barrier is one of *lifestyle and behavior*. For the manufacturers of refrigerators, a stable *macroeconomic condition* is necessary to invest in a production line for more sophisticated refrigerators with high energy efficiency.

Often, people do not care how much energy is consumed by each appliance. Even if they do care, a lack of information could prevent them from choosing the right one. The same goes for firms. As a result, there are many energy efficiency improvement opportunities ignored by all countries. Often, the pay-back periods for energy efficiency investment are as short as two years. This means that if you buy a more energy-efficient appliance, then your energy consumption costs would be reduced, and you would recover the extra upfront costs in two years and enjoy the lowered energy costs after that.

This is where government can play a role. Governments can provide reliable information as to how much energy is consumed by each appliance. Governments can also set standards that appliance manufacturers have to meet. There have been many success stories of governmental policies improving energy efficiency (See. Fig. 2.5). It is important to note that energy efficiency improvements will not happen without strong policies to support them.



Fig 2.5. Average energy consumption of new refrigerators in the U.S. (Annual energy consumption has dropped significantly because of a series of policy interventions.)



### 2.3 Common Interests in Energy Efficiency: Beyond the Climate Policy Stalemate

As we discussed in Chapter 1, focusing on cooperative issues could overcome the stalemate that is seen in climate change negotiations under UNFCCC. Here we briefly describe how energy efficiency cooperation serves many policy goals of Japan and other East Asian countries.

In Japan, there are six national interests in promoting energy efficiency policies and emission reduction measures in East Asia:

1. *Energy security.* Less energy consumption in developing countries eases competition for sources of supply.
2. *Regional security.* Territorial disputes are often related to mineral resources. Energy conservation would moderate the potential for such disputes. To cooperate on a commonly-beneficial agenda would contribute to mutual trust.
3. *Market development for highly efficient equipment.* Japanese manufacturers will benefit given their high technological capacity to produce highly efficient equipment.
4. *Incentives for more ambitious efficiency policies in Japan.* With the expectation that Asian countries will follow suit in the future, ambitious efficiency policies would be welcomed by policy-makers and manufacturers.

5. *Climate change mitigation.* Japan is committed to climate change mitigation; hence, cost-effective and politically feasible options to cut emissions in developing countries are desirable.
6. *Trans-boundary air pollution mitigation,* such as acid rain.

For developing countries, there are at least six national interests:

1. *Economic efficiency.* Energy efficiency improvement is a key element of productivity and contributes to the economic efficiency of the economy as a whole.
2. *Development of the market for globally-competitive equipment.* China and Southeast Asian countries have used the international system as a vehicle to train and modernize their industries. A notable example is their willingness to participate in the WTO, despite the challenges to some domestic economic sectors.
3. *Energy security.* China, Korea and some Southeast Asian countries are highly dependent on imported oil.
4. *Regional security.*
5. *Pollution prevention.*
6. *Climate change mitigation.*

Some of these national interests have been present for decades, but others are new, and the importance of energy efficiency policy is constantly increasing, given burgeoning economic development, energy consumption growth, mounting environmental concerns and territorial tensions in the region. The time seems ripe for further enhancing regional cooperation on energy efficiency that fits within the national interests of all parties.

Although the above argument seems applicable in general, there would be more specific interests and disinterests with a closer look at individual stakeholders; a serious consideration of aligned interests is a prerequisite for politically feasible policy-making. A policy research question throughout this book is how we can save energy while addressing these specific requirements through wise design and implementation of policy.

## **2.4 Why the CDM Cannot Deliver Massive Energy Savings**

The Clean Development Mechanism of the Kyoto Protocol has been deemed by the climate policy circle as a key vehicle promoting energy efficiency in developing countries since 1997. While many efforts are still ongoing, and it is too early to judge the program's success in a comprehensive way, the initial historical record was less than expected and it is not likely that the CDM will bring about major energy efficiency improvements in developing countries. As a consequence, energy efficiency in developing countries is largely missing from the Kyoto Protocol framework and discouraged in practice under CDM.

## A. Brief history of the CDM

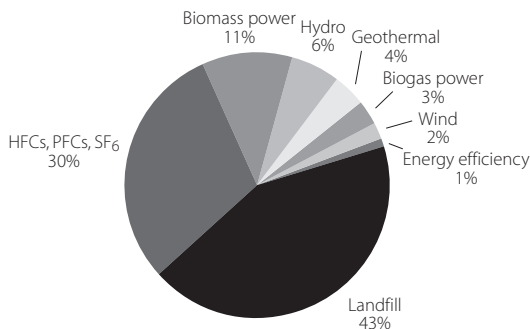
The CDM has two origins: one is Joint Implementation, as stipulated in the UNFCCC; the other is the Clean Development Fund proposal by Brazil during negotiations in Kyoto in 1997. The intent of the latter was to penalize countries that failed to meet binding targets and to use the revenue obtained from these penalties to assist developing countries. Combining the two origins, Parties created the concept of the CDM and agreed on Article 12 of the Kyoto Protocol. At COP-7, the CDM rulebook (Marrakech Accords) was agreed on and adopted. It specifies organizational bodies such as the EB and DOE and their operational rules.

The Marrakech Accords specify that the CDM Executive Board (EB) supervise the CDM. The EB established the Methodology Panel (Meth Panel). The Methodology Panel, with its technical capability, drafted a recommendation regarding methodologies of baseline and monitoring for the EB's consideration.

The EB began the process of approving new baseline and monitoring methodologies in 2003. They have had 18 meetings since then, and, as of March 2005, have approved 23 methodologies. Also, two consolidated methodologies were approved for landfill methane recovery and renewable power generation connected to an existing power grid.

Regarding the types of submitted CDM projects and methodologies, of 89 methodologies submitted by March 2005, 28 address energy efficiency; 24 renewable electricity generation; and 23 fugitive methane emissions. Only four address industrial gases. However, of the 23 approved methodologies, only three address energy efficiency while two address industrial gases; five renewable energy; and nine fugitive methane emissions. Of 74 projects available for public comments in the validation process, 46 concern renewable electricity generation; 24 fugitive methane emissions; and only two energy efficiency. As a result, the major share of the estimated CERs to date comes from landfill methane recovery, HFC deconstruction and N<sub>2</sub>O deconstruction as shown in Figure 2.6.

Figure 2.6. CDM activities: Few energy efficiency projects approved.



Energy efficiency improvement has largely been absent from CDM activities so far. One of the reasons is that it is less straightforward in demonstrating additionality<sup>8</sup> than other types of projects, such as methane recovery and renewable energy projects. Take the example of energy efficiency improvement investment with a payback period of five years at an office building. This payback time frame is surely longer than common practice in many countries where typical payback periods are one to three years. However, this investment incurs net benefits from the sixth year on; hence people may wonder if the investment would occur regardless of CDM credits. Scientifically, there are methodologies with which you can argue that this project is “additional to what would otherwise occur” by establishing a control group, for example. However, it does not necessarily mean that you can easily convince everyone concerned of the environmental integrity of the CDM.

There are intensive activities going on to develop additionality tests, and baseline and monitoring methodologies that would appropriately reward energy efficiency improvement projects with emission reduction credits of CDM (called Certified Emission Reduction units, or CERs), including the Japanese government initiative titled “Future CDM” (METI/MRI/CRIEPI, 2006).

On the international negotiation front, there has been a debate about whether a “Policy CDM” can be credited under the Kyoto Protocol. In other words, if a developing country develops and implements a policy that results in emission reductions, does it deserve CERs? At the COP-11/MOP-1 in Montreal in 2005, countries decided that 1) such a policy would not be credited as CDM, but that 2) activities under such a program can be bundled as a CDM project and can be credited.<sup>9</sup> While it remains to be seen how they are interpreted by the Executive Board and whether they result in projects and emission cuts, it is unlikely that the majority of proven, popular and powerful policy tools reviewed in section 2.2, including emission standards, are to be credited under the CDM. This means there will not be massive energy savings from the CDM.

## **B. Can the CDM deliver energy efficiency?**

In order to see if the CDM can deliver energy efficiency, let us analyze various expectations and realities surrounding CDM using Figure 2.7. There are two key axes:

---

8 Under the CDM, project participants are mandated to demonstrate the “additionality,” i.e., that the project is additional to what would otherwise occur (baseline). The difference between the baseline emissions and project emissions are credited as Certified Emission Reduction units.

9 The exact wording is as follows. “[COP/MOP-1] Decides that a local/regional/national policy or standard cannot be considered as a Clean Development Mechanism project activity, but that project activities under a program of activities can be registered as a single Clean Development Mechanism project activity provided that approved baseline and monitoring methodologies are used that, *inter alia*, define the appropriate boundary, avoid double-counting and account for leakage, ensuring that the emission reductions are real, measurable and verifiable, and additional to any that would occur in the absence of the project activity.”

- 1) *Additionality*. Additionality is difficult to define and the effort to do so easily becomes a futile and eternal debate. The situation has become more complex since two different interests are related to the CDM. Environmentalists want strict and complex additionality judgments. The business sector wants simple and quick ones. Finding a satisfactory solution to satisfy both parties is not easy.
- 2) *Decision-making institutions and process*. If the CDM were a domestic law, then it is the role of the government to judge on additionality and implement it by specifying detailed rules, including administrative order or standards. There are many environmental policies implemented in such a way, even the key concepts and stakeholder arrangements are very complex (e.g., the “precautionary principle” is a very difficult concept, but countries do manage it in domestic environmental policy). Such an administrative discretion is essential to implement law in practice. But the CDM is different. Large UN organizations, including the UNFCCC secretariat, the Executive Board, Expert Panels, and Conferences and Meetings of the Parties are in charge of its implementation. The process is open to the public to secure political support from environmentalists and developing countries. Being transparent is a very beneficial characteristic for the UN organizations in charge of environmental issues. However, this also means there are a series of hearings and rulings before developing CDM methodologies and CDM projects, and the outcome is highly uncertain. This can impede the effective functioning of business. Stable institutions and legal systems are important for encouraging business investments for the CDM.

In a nutshell, there is a big question as to whether the UN is the appropriate body to print and control the flow of virtual money—in the form of emission credits—in a business-friendly manner. What a UN organization could surely do is create and implement some rules to influence existing market activities such as production activities and commodity flows of timber, for example. Creating a new commodity or printing money and distributing it to the world is a major challenge, and very difficult to achieve for a UN organization.

Of course, there are some improvements that could alleviate the concerns raised above. For example, setting some rules that are simple yet transparent and environmentally-sound might be possible. Or, institutional development of a promoting body for the CDM with more permanent specialists may help in such rule-setting. Such efforts could be considered.

There are, however, more fundamental limits to CDM. First is the *continuation of a Kyoto-style binding cap regime* itself. It is possible that most countries decide not to take on binding caps for a post-2012 climate regime. If the number of countries taking on binding caps is small, it would be difficult for them to have ambitious targets and, thus, the credit demand created for the CDM

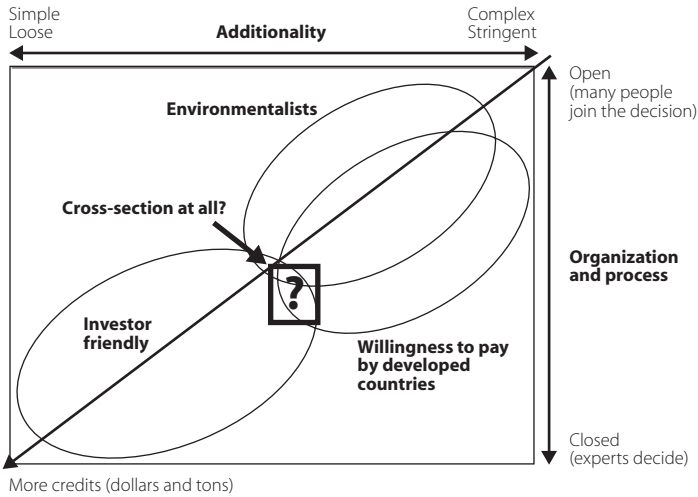
would be small. Yet, it is possible to imagine a regime in which a national binding cap is abandoned but incentive for the CDM is created as a government procurement system for certain amounts of CERs in the absence of national cap.

Still, there is a more fundamental limit. That is the *willingness-to-pay by developed countries*. Imagine that the CDM is the major vehicle for energy efficiency improvement in China. Chinese emissions are four billion tons of CO<sub>2</sub> annually. If 10 per cent of them are cut through the CDM and the price of credits are US\$10 per ton, then US\$4 billion per annum will flow to China. Agreeing upon such an institutional framework, which implies massive financial flows to many developing countries, is *impossible* in current international politics, in which Japanese ODA is declining and the U.S. is not spending a dollar on ODA to China.

One may argue that once the CDM is regarded as a “market mechanism” and becomes less political, an arrangement implying large financial flows would be possible. One can point to many other decisions affecting larger amounts of financial flows to developing countries—for example, rules regarding foreign direct investment, which dwarfs financial flow generated by the CDM. However, such an argument is weak since the negotiations on the CDM and binding caps *are* extremely political and there is no sign of change in the near future. Since the CDM is considered very political, it looks like another form of ODA to most policy-makers. If it is indeed another form of ODA, then the CDM is not likely to flourish. It seems extremely difficult and unlikely that countries will agree on binding targets that imply new financial transfers worth billions of dollars.

The key concept of the CDM is that “additional costs” associated with greenhouse gas emissions reduction projects would be paid by developed countries. However, if the CDM is going to cover massive greenhouse gas emissions cuts in developing countries, this very concept exceeds the limit of willingness-to-pay. Then, what is the likely development of the CDM in the future? Our expectation is that the CDM will play only a marginal role in cutting greenhouse gas emissions. Surely it played an important role in addressing methane gas emissions and HFC emissions that would not have been cut otherwise. Furthermore, it may play some role in energy efficiency improvement in some sectors. However, the role of the CDM will remain only marginal, compared to the huge potential energy savings in China and many other countries. The large share of energy efficiency improvement will come from each individual country’s policies. Addressing national policies and promoting further international cooperation will deliver more energy savings than promoting the CDM.

Figure 2.7. Stakeholder interests surrounding the CDM.



## 2.5 Conclusion

Energy efficiency and conservation are promising ways to promote economic development and energy security, while simultaneously addressing the environmental impacts of energy use—from local air and water pollution to global climate change. Despite the need for increased energy efficiency in East Asia, international climate negotiations under the UNFCCC have thus far yielded relatively few efforts on energy efficiency. The Clean Development Mechanism is intended to encourage non-Annex I (developing) countries to participate in greenhouse gas reduction activities, which could include energy efficiency and conservation. In practice, however, current rules concerning baselines and additionality for CDM projects favor methane recovery—not energy efficiency. Precisely because energy efficiency projects can be economically favorable, they have had difficulty gaining approval as CDM projects. Furthermore, other obstacles, including political interests, will likely limit the role of the CDM.

Nevertheless, East Asian countries have been promoting energy efficiency policies within their own borders, as well as engaging in international energy efficiency cooperation. As highlighted in this chapter, most East Asian countries have established government agencies or departments with a mandate to pursue energy efficiency, and have enacted a variety of policies aimed at promoting energy efficiency and conservation. These national energy efficiency efforts were undertaken for multiple reasons, including economic development, energy security and environmental protection. With these common interests, East Asian countries favor international cooperation on energy efficiency. In 2005

and early 2006, dialogue and new initiatives on energy efficiency have greatly increased in the region, creating a political window of opportunity for even further cooperation.





**Part II**  
**Existing Energy Efficiency Cooperation**  
**in East Asia**



Part I identified a convergence of interests in energy efficiency in East Asia and a political window of opportunity for further cooperation. In order to suggest an effective strategy for further cooperation, the research team first sought to draw lessons from past experience. Part II (Chapters 3, 4 and 5) presents the findings from analysis of existing energy efficiency cooperation in the region. The analysis was driven by the following questions:

- What kinds of cooperation on energy efficiency and conservation are already taking place in East Asia?
- What is their scale and scope?
- How do they compare in terms of the way cooperation is structured?
- What policy mechanisms do the cooperation efforts use?
- Which sectors and technologies are targeted?
- How have these cooperation programs performed?
- Where are there opportunities to strengthen existing cooperation or to facilitate new areas of cooperation?
- What are the other implications for future cooperation efforts?

The research team used information from interviews, stakeholder workshops, project documents, reports, brochures, online data and other analyses, enhanced by the team's own experience in energy and environmental cooperation. After a Scoping Workshop in Tokyo in April 2005, the research team undertook extensive interviews in Japan and China from May through August 2005. Interviews were also conducted in South Korea and the Philippines. Interviewees included government officials from key national agencies; representatives of industry; staff of national and multilateral aid agencies; staff of non-governmental organizations active in energy efficiency cooperation; and researchers engaged in energy and environmental policy and cooperation. The purpose of the interviews was twofold: (1) to gain information on existing cooperation activities; and (2) to hear perspectives on the idea of a new fund dedicated to energy

efficiency cooperation in East Asia. After initial analysis of the findings, interim stakeholder workshops were held in September 2005 in Tokyo and Beijing to share the findings and further discuss the proposal for the fund. Additional analysis was then conducted during the fall and into the new year, leading to public presentation of a proposal for action at a formal workshop in Tokyo in February 2006. This book represents the findings and recommendations from the research team.

The analysis of existing energy efficiency cooperation was organized around three main aspects:

- Cooperation Structure: type of organization, level of political agreement;
- Cooperation Mechanisms: form of cooperation, cooperation process; and
- Cooperation Targets: types of technologies, economic sectors targeted.

The next three chapters summarize three significant trends in the above aspects of existing energy efficiency cooperation in East Asia and discuss implications for future cooperation. Chapter 3, on cooperation structure, notes the growing role of independent international cooperation networks in promoting energy efficiency. Chapter 4, on cooperation mechanisms, highlights the effectiveness of policy development cooperation in achieving significant energy savings. Chapter 5, on cooperation targets, identifies activities to improve efficiency in the energy-intensive industrial sector and points to the need for more cooperation in economic sectors with numerous, diverse actors, e.g., appliances, transportation and buildings.

# Chapter 3

## Cooperation Structure: The Growing Role of Independent Cooperation Networks

By Stephanie Ohshita, Steve Wiel and Gørild Heggelund

Existing cooperation on energy efficiency in East Asia involves a variety of organizations, from large multilateral institutions to small think-tanks and foundations. Cooperation mechanisms range from exchanges of experts and trainees, to the sharing of policy information at regional forums, to multi-million dollar technology installations. A variety of sectors have been targeted, from appliances to buildings to industry and electricity. Some cooperation efforts emphasize measurement of resulting energy savings, while others undertake less quantifiable routes to promoting energy conservation. Cooperation activity on energy efficiency has increased substantially over the past 10 to 15 years, yet those engaged in the cooperation emphasize that even more is needed.

In this chapter, we identify existing energy efficiency cooperation activities in East Asia and examine the organizational structure of those activities. While cooperation on renewable energy, as well as projects under the Clean Development Mechanism, can contribute to a sustainable economy, energy security and environmental protection, only cooperation efforts focused on energy efficiency are analyzed here. Similarly, East Asian countries have engaged in cooperation on various aspects of energy security, but only activities aimed at energy efficiency are discussed here.<sup>1</sup> Cooperation activities on energy efficiency and conservation are presented in four groups, based on the type of organizations that participate:

1. bilateral cooperation;
2. multilateral cooperation;
3. regional cooperation; and
4. independent international cooperation networks.

---

1 Because this scope focuses only on energy efficiency cooperation, the following types of cooperation efforts are **not** included:

- energy infrastructure built with official development assistance (ODA) or through energy security cooperation, unless the emphasis is on energy efficiency and conservation;
- projects that focus solely on renewable energy;
- general cooperation on climate change strategies;
- CDM projects, unless they emphasize energy efficiency;
- non-CO<sub>2</sub> greenhouse gas reduction projects (e.g., CFC destruction);
- carbon sequestration; and
- fuel switching to lower carbon fuels, unless the switch involves upgrading to a more energy-efficient process.

The types of organizations engaged in bilateral and multilateral cooperation are fairly well-defined. Bilateral energy efficiency cooperation may occur between the energy agencies of two countries, or it may involve official development assistance (ODA) from the government of one country to another. Multilateral cooperation involves ODA from multiple countries or a development bank, such as the World Bank or the Asian Development Bank, to the government of a recipient country. Similarly, regional cooperation involves the organizations of several East Asian governments. What requires some explanation is the fourth category of organizations—independent international cooperation networks. In contrast to government organizations engaging in cooperation on a bilateral, multilateral or regional level, independent cooperation networks are non-governmental. Rather than use the term non-governmental organization (NGO), we want to highlight organizations that are not limited to small-scale projects within a single country, but are international in scope and involve groupings of individuals with substantial expertise, i.e., international networks. We highlight these international network-based NGOs because we have observed their effectiveness in promoting energy efficiency and conservation.

The rest of this chapter describes the activities each type of organization is engaged in and provides a detailed example of each. Tables summarize key parameters of the cooperation: the program or project; lead organizations; time frame; and type of cooperation. (The types of cooperation, or cooperation mechanisms, are defined and examined in Chapter 4.) The analysis below shows the strengths and weaknesses of different cooperation agreements and their organizational structures, and points to the growing role of independent international cooperation networks.

### **3.1 Experience from Bilateral Cooperation**

Bilateral cooperation activities in East Asia focused on energy efficiency and conservation are summarized in Table 3.1. Nearly all East Asian countries have participated in some form of bilateral cooperation, with most activities occurring since the 1990s. China has been the most active participant, engaging in cooperation across several sectors (industry, government, buildings and appliances) with a number of countries (Japan, the U.S., Canada and the U.K.). Japan has been the most active donor, providing funds and expertise in various forms since the 1980s (e.g., technical assistance, training programs and technology demonstration). Because Japan has been particularly active on a bilateral level, we examine its experience and lessons learned in more detail here.

**Table 3.1. Bilateral cooperation on East Asian energy efficiency.**

Cooperation activity	Type of cooperation <sup>2</sup>	Target sector	Lead organizations	Timeframe
<b>Japan-China</b>				
JICA Energy Efficiency Training	TA, CB, PR/Ed	Industry, government	JICA; various overseas partners	1980s–present
Green Aid Plan: Energy Efficiency Projects	TD, TA	Industry (steel, cement, chemical), electric power	Japan: METI, NEDO, others; China: NDRC, industrial agencies	1992–present
Dalian Energy Center	TA, CB	Industry	Japan: MOFA, JICA, ECCJ; China: MOST, SETC, Dalian city	1992–1998
<b>Japan-SE Asia</b>				
JICA Energy Efficiency Training	TA, CB, PR/Ed	Industry, government	JICA; various overseas partners	1980s–present
Green Aid Plan: Energy Efficiency Projects	TD, TA	Industry (steel, cement, chemical), electric power	Japan: METI, NEDO, JETRO; Thailand, Indonesia, Philippines, Malaysia, India, Vietnam: various agencies	1992–present
Energy Conservation Center, Thailand: Energy Manager System Development	CB, TA, PD	Government, industry	Japan: METI, NEDO, JICA, ECCJ; Thailand: DEDE	1999–2005
<b>U.S.-China</b>				
Green Buildings	TA, PD	Buildings	U.S.: LBNL, NRDC, Energy Foundation, U.S. DOE; China: CBECA, MOC	1998–2000
China Motor Systems Energy Conservation Program <sup>3</sup>	TA, PD	Industry	U.S.: LBNL, ACEEE, U.S. DOE; UNIDO; China: MOFTEC, CECIC, Shanghai, Jiangsu	2001–2004
Beijing Energy Efficiency Center (BECon) <sup>4</sup>	CB, PD	Government, industry	U.S.: PNNL, LBNL; China: ERI, NDRC	1993–present
U.S.-China Energy and Environmental Technology Center	TA, MD	Industry	U.S. DOE, Tulane Univ.; China: Tsinghua Univ.	1997–present
<b>Canada-China</b>				
CIDA Energy Efficient Buildings Project	TA	Buildings	Canada: CIDA China: MOC	1996–2002

2 See Chapter 4 for definitions and discussion on the type of cooperation.

3 A report by McKane *et al.* (2003) provides an overview of the China industrial motors program. See also: <http://eetd.lbl.gov/ea/indpart/china.html>

4 For further information about the Beijing Energy Efficiency Center (BECon), see: <http://www.beconchina.org/>



Cooperation activity	Type of cooperation	Target sector	Lead organizations	Timeframe
<b>U.K.-China</b>				
Implementation Support for Initiative on Top 1,000 Energy-Using Enterprises	PD	Industry	U.K.: DEFRA; U.S.: Energy Foundation; China: NDRC, National Energy Leading Group, SOASAC, NBS	2006–present

**Key: Form of Cooperation:** CB = Capacity Building, PD = Policy Development, MD = Market Development, PR/Ed = Public Outreach/Education, TA = Technical Assistance, TD = Technology Development.

## Japanese Bilateral Energy Efficiency Cooperation in East Asia

Based on its experience of developing a strong industrial economy with limited domestic energy resources, Japan emphasizes energy efficiency and conservation in policy and practice. Expanding its domestic efforts overseas, Japan has engaged in energy efficiency cooperation activities in East Asia since the 1980s. Lacking a central aid agency, Japanese cooperation activities involve multiple agencies, overseen by multiple ministries.

### Japan International Cooperation Agency (JICA)

Japan's longest-running cooperation activity in energy efficiency is the provision of technical assistance, funded by grants from the Japan International Cooperation Agency (JICA), as a part of Japanese official development assistance (ODA). Technical assistance has involved sending Japanese energy experts to neighboring countries to share Japanese energy management practices and experience with energy-efficient technologies. Between 1980 and 2004, 96 projects were conducted. Of those, 26 involved missions to Thailand; 17 to Malaysia; 12 to China; and 11 to Indonesia. JICA also provides grants to bring foreign managers and technicians to Japan for study tours and training. Between 1980 and 2004, 63 training projects were hosted, of which 16 projects involved technical staff from Thailand; 12 from China; four from Malaysia; three from Indonesia; and two from the Philippines.<sup>5</sup>

### Japan Bank for International Cooperation (JBIC)

The other main Japanese agency involved in ODA is the Japan Bank for International Cooperation (JBIC, formed from a merger of OECF and JEXIM), which manages concessional lending. Since the 1990s, the Japanese government has asked JBIC to provide special lending terms for projects that involve environmental protection and energy efficiency.<sup>6</sup> Following the third Conference of the Parties (COP-3) to the Framework Convention on Climate Change (FCCC) in Kyoto in December 1997, Japan announced new loan

5 Data from the Japanese Agency of Natural Resources and Energy (2006).

6 For a brief history of Japan's environmental lending and further details on Japan's aid bureaucracy, see Ohshita 2003: Chapter 3.

terms for environmental projects and an expanded range of activities to be included under the new terms. Energy conservation projects qualify for special environmental loan terms—terms with the lowest interest rate and longest payback period. For most developing countries, special environmental loans were made available at an interest rate of 0.75 per cent with a repayment period of 40 years.<sup>7</sup> The resulting grant element for special environmental loans, 40.6 per cent, is a huge increase from that of standard loans, and represents Japan's effort to make environmental aid projects as appealing as possible. Thailand was the first country to request a loan under the new environmental terms, followed by Vietnam and China. While JBIC staff are eager to provide increased lending on energy efficiency, and while total environmental lending amounts to roughly 20 per cent of the total aid budget, they have not yet seen a substantial increase in requests for energy efficiency loans from borrowers.<sup>8</sup> According to Japan's aid policy, all loans are request-based, meaning that the agency can only direct more financing toward energy efficiency if they receive requests for those kinds of projects.

### Ministry of Economy, Trade, and Industry (METI)

Parallel to ODA, Japan has engaged in another major effort to promote energy efficiency: the Green Aid Plan (GAP). Japan's Ministry of Economy, Trade and Industry (METI, formerly MITI) launched its Green Aid Plan in 1992 to promote the introduction and dissemination of cleaner energy technologies in the industrial sector of Asian developing countries. Two main types of technology are targeted: energy-efficient technologies and clean coal technologies. Under the Green Aid Plan, METI engages in government-to-government policy dialogue with their counterpart agencies in the recipient countries to determine the host country's technology preferences. The selection of specific technologies and projects is based on host-country policies and priorities, and the availability of technologies from Japanese industry.<sup>9</sup> The organizational structure of the GAP is illustrated in Figure 3.1, showing China as the host country. The New Energy and Industrial Technology Development Organization (NEDO), a quasi-governmental group affiliated with METI, is the main implementing organization for the GAP.

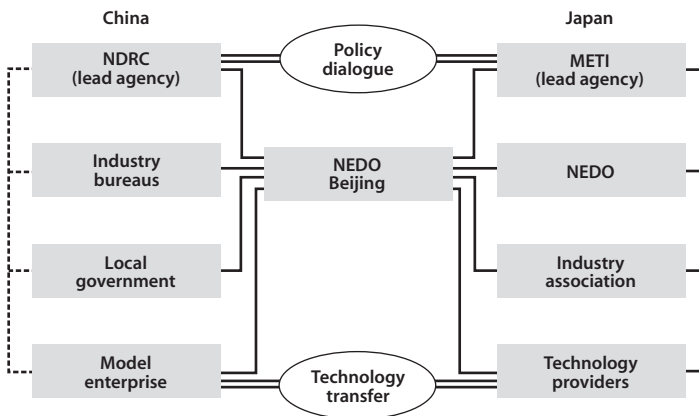
---

7 For middle-income countries, special environmental loans were made available at an interest rate of 1.8 per cent with the repayment period remaining at the standard term of 25 years. The 1.8 per cent interest rate for middle-income countries was further reduced from the 2.5 per cent rate announced earlier in September 1997.

8 Interviews with JBIC staff; Tokyo, 2004; Beijing, 2006.

9 For more information on the GAP, see Ohshita 2003; Ohshita and Ortolano 2003; and Ohshita 2002.

Figure 3.1. Organizational structure of cooperation under Japan's Green Aid Plan.



The Green Aid Plan provides public funds to Japanese firms to modify and demonstrate their technologies in enterprises in recipient countries. The funds come mainly from Japan's Special Energy Account over which METI has some discretion. Because GAP operates in large part outside Japan's official development assistance, METI is able to take a more proactive stance in promoting cleaner energy technology, engaging in policy dialogue rather than waiting for requests for energy efficiency aid. A smaller proportion of GAP funds (~20 per cent) come from Japan's General Account and are considered part of Japanese ODA; these funds are typically directed toward training activities. METI also provides funds to Japanese industrial associations and training organizations to conduct feasibility studies and training on the operation of the Japanese technologies. Recipient enterprises are granted ownership of the equipment and training, but are responsible for necessary on-site modification of their facilities and for ongoing operation and maintenance costs. Little money goes directly to the recipient government or enterprises.

To date, 35 industrial energy efficiency projects have been carried out under METI's Green Aid Plan. Of those, 18 were in China; five in Indonesia; four in Thailand; two in Vietnam; two in Myanmar; two in India; one in Malaysia; and one in the Philippines. Achievements of the GAP include demonstration of the technical feasibility of various industrial energy efficiency technologies under local conditions, and increased awareness and enhanced government relations between Japan and the host countries through GAP policy dialogue. However, the Green Aid Plan's goal of wider technology diffusion has not been realized; for the most part, technologies have not spread and have not led directly to wider energy efficiency gains in the host countries.

Based on these results, METI has been considering other approaches toward energy efficiency cooperation, including the development of energy manager programs and greater activity on the development of policies in East Asian countries to encourage the spread of energy-efficient industrial technologies.

In terms of organizational structure, Japanese bilateral cooperation on energy efficiency is characterized by the involvement of multiple agencies and ministries, rather than a single aid agency. Compared to the size of its ODA budget, Japan has relatively few staff in its aid agencies. Although staff are directed to work on energy efficiency and pay attention to particular countries (such as China), frequent rotation of staff means that few staff have an in-depth knowledge of a particular country's situation, unless they continue to be involved with the same country in their different posts. The Green Aid Plan was, in part, a reaction to the limitations of Japan's ODA system, with METI emphasizing and promoting energy efficiency, consistent with its mission.

### 3.2 Experience from Multilateral Institutions

Multilateral efforts to promote energy efficiency in East Asia have been carried out primarily through the Global Environment Facility (GEF) as measures to promote sustainable development and mitigate climate change (see Table 3.2). The GEF projects have targeted multiple sectors, especially industry, appliances and the electricity utility effort at demand-side management (DSM). GEF projects have frequently used multiple cooperation mechanisms, combining technical assistance and technology development with policy development cooperation and public outreach to promote markets for more efficient technologies. Because most multilateral activity has come under the GEF, the structure of that activity is discussed further below.

Table 3.2. Multilateral cooperation on East Asian energy efficiency.

Cooperation activity	Type of cooperation	Target sector	Lead organizations	Timeframe
<b>GEF-World Bank-China</b>				
China Energy Conservation Project: EMCs	CB, MD	EMCs (ESCOs), industry	GEF, World Bank; China: SETC, provincial ETCs	1998–2006
Industrial Boiler Project	TA, TD, MD	Boiler manufacturers, industry	GEF, World Bank; China: SETC, others	1995–2004
<b>GEF-World Bank-Thailand</b>				
Electricity Energy Efficiency: DSM	TA, TD, CB, MD, PR/Ed	Electric power, appliance manufacturers; consumers	GEF, World Bank; Thailand: EGAT (national electricity utility)	1993–1998
Building Chiller Replacement Program	TA, TD, CB, MD, PR/Ed	Chiller manufacturers, consumers, government	GEF, World Bank; Thailand: IFCT, DIW	1998–2003

## Cooperative Climate: Energy Efficiency Action in East Asia

Cooperation activity	Type of cooperation	Target sector	Lead organizations	Timeframe
<b>GEF-UNDP-China</b>				
Commercialization of Energy-efficient Refrigerators	TA, TD, PD, CB, MD, PR/Ed	Manufacturers; distributors; consumers	GEF, UNDP; China: SEPA, State Light Industry Bureau	1999–2004
End-Use Energy Efficiency Program (EUEEP)	TA, TD, PD, CB, MD, PR/Ed	Industry, buildings ERI, MOC	GEF, UNDP; China: NDRC,	2005–present
<b>GEF- IFC - multiple countries (in Asia: China, Philippines)</b>				
Efficient Lighting Initiative (ELI)	TA, TD, PD, CB, MD, PR/Ed	Lighting manufacturers, consumers	GEF, IFC, ELI Quality Certification Institute, multiple countries	1998–2003 (under GEF); ongoing
<b>ADB-China</b>				
Energy Conservation and Resource Management Project	TA, PD	Government, electric power, industry	ADB, others to be determined	2005–present
Industrial Energy Efficiency	TA, TD	Industry (chemical, cement, steel)	ADB; China: SETC	1996–2001
<b>ADB-Asia</b>				
Energy Efficiency Fund	TA, TD	To be determined	ADB, others to be determined	2006–present
ESCO Fund	TA, CB, MD, PR/Ed	ESCOs, industry, buildings, public/ government	ADB; India, Malaysia, Philippines, Thailand	2003–present
REACH Program	TA, CB, MD, PR/Ed	Government, finance	ADB; Dutch, Canadian, Danish, Finnish funds; 15 member countries	2002–present
<b>EU-China</b>				
Energy and Environment Program (EEP)	TA, TD, PD, CB, MD	Industry, EMCs, residential, public/ government	EU; AEA Technology Integration Environment and Energy, Dansk Energi Mngmt; China: MOFCOM, NDRC, MOST, CNPC	2003–2008

**Key: Form of Cooperation:** CB = Capacity Building; PD = Policy Development; MD = Market Development; PR/Ed = Public Outreach/Education; TA = Technical Assistance; TD = Technology Development.

### Asian Development Bank (ADB)

The Asian Development Bank (ADB) has sponsored several activities with an energy efficiency focus. In the 1990s, the largest ADB effort in this regard was a program on industrial energy efficiency in China. That ADB effort involved technical assistance and technology cooperation, and it targeted three energy-intensive industrial sub-sectors: chemical, cement and metallurgical. The ADB industrial energy efficiency program had some similarities to Japan's Green Aid Plan, in that it focused on technology installations at existing industrial enterprises and required some degree of co-financing from the recipient government and enterprises. Lessons learned include the importance of facilitating local financing, and the need for policies that encourage investment in more efficient technologies.

More recently, ADB has been exploring demand-side management in the form of an “efficiency power plant” or energy conservation activities that replace the need for a new electric power plant. ADB has also been exploring options to promote Energy Service Corporations (ESCOs), watching national efforts and World Bank experience (under GEF), as well as holding workshops. ADB launched its own ESCO program in 2003 and has begun ESCO activities in India, Malaysia, the Philippines and Thailand.<sup>10</sup>

In March 2006, ADB announced it will launch a new energy efficiency fund within the year. ADB president Haruhiko Kuroda stated that the US\$1 billion initiative will support energy efficiency measures being developed by its member countries. With the demand for energy in Asia expected to increase “exponentially” in the next 10 to 15 years, the agenda of ADB’s 39th annual meeting in Hyderabad (May 2006) included the matter of ADB’s role in assisting countries to achieve energy efficiency improvements.<sup>11</sup>

In addition to GEF and ADB activities, the European Union launched a large energy efficiency program (EEP) in China in 2003. The EU efforts involve several member states and three main private firms: AEA Technology (U.K.); Integration Environment and Energy (Germany); and Dansk Energi Management (Denmark). The Ministry of Commerce and the National Development and Reform Commission lead the effort on the Chinese side. The EU EEP targets multiple sectors and is discussed further in Chapter 5.

### Lessons from GEF in China

The Global Environment Facility (GEF) was launched in 1991 under a joint program run by the United Nations Development Program (UNDP); the United Nations Environment Program; (UNEP) and the World Bank (WB). These agencies are the implementing agencies (IAs) of the GEF.<sup>12</sup> Each of the three implementing agencies has its own GEF organizational unit based at their respective headquarters. The World Bank is a GEF trustee. The UNDP plays a primary role in capacity building and technical assistance; UNEP in technical and scientific analysis; and the World Bank in managing investment projects (Werksman, 2004 in Heggelund *et al.*, 2005). The GEF provides new and additional grants and concessional funding to meet the *incremental*

---

10 For more information on ADB ESCO activities, see <http://www.adb.org/Documents/News/2003/nr2003176.asp>

11 “ADB to launch \$1 bn energy efficiency fund,” Regional Bureau, *Business Standard Online*. Hyderabad, March 9, 2006. Available online at <http://www.business-standard.com/bsonline/story-page.php?bKeyFlag=BO&auto=14515>

12 GEF’s Council and Assembly have approved Asian Development Bank (ADB) for direct access to GEF full project resources. This enables ADB to prepare and implement GEF projects on behalf of GEF; to submit project proposals directly to GEF rather than through an implementing agency; and to receive project grants directly from the GEF Trustee and be directly accountable for their use.

costs<sup>13</sup> of measures to achieve *global environmental benefits* in six focal areas listed as Biodiversity, Climate Change, International Waters, Land Degradation, the Ozone Layer<sup>14</sup> and Persistent Organic Pollutants (POPs). In China, the Ministry of Finance (MOF), with its Department of International Cooperation, is the political and operational focal point for the GEF (in addition to being the funding window for the WB and ADB). The State Environmental Protection Administration (SEPA) is the technical support department for GEF projects. Its responsibility is to support the Ministry of Finance by supplying GEF policy studies, project management and professional consultants. SEPA coordinates actions with the relevant ministries. The GEF Secretary Office (joint office of MOF and SEPA) was set up in 2000 in order to boost GEF funding and project management efficiency.<sup>15</sup>

China has benefited more from GEF money than any other country, and more than 50 projects have been launched with Chinese participation. GEF has allocated nearly US\$467 million to China (Good, 2004). This amount has gone to 44 Chinese-based projects, of which 23 are climate policy related (such as energy efficiency, renewable energy projects, etc.).<sup>16</sup> During the first decade of GEF operations, the GEF and its implementing agencies have contributed to increased awareness and technology development as well as boosted institutional capacity through participation in project activities and training, particularly at the central level, but to some extent at provincial and local levels as well. Domestic institutional capacity through the establishment of the GEF Office—and other more narrowly defined institutions connected to the projects—have been established.<sup>17</sup> Technological innovations and job creation have also resulted from some GEF projects. The GEF has provided China with technical assistance, hardware upgrades and maintenance, and has promoted environmentally-friendly technology.

One example is the UNDP-implemented project for the commercialization of energy-efficient CFC-free refrigerators in China, launched in 2000.<sup>18</sup> Several forms of cooperation were utilized: technical assistance; technology

---

13 Incremental costs are additional costs associated with transforming a project with national benefits into one with global environmental benefits. See [http://www.gefweb.org/Operational\\_Policies/Eligibility\\_Criteria/Incremental\\_Costs/incremental\\_costs.html](http://www.gefweb.org/Operational_Policies/Eligibility_Criteria/Incremental_Costs/incremental_costs.html)

14 The GEF funds projects that enable the Russian Federation and nations in Eastern Europe and central Asia to phase out their use of ozone-destroying chemicals.

15 See Heggelund, Andresen and Sun (2005) for a discussion of the implementation of GEF projects in China.

16 For more details on GEF projects in China, see the GEF Web site: [http://www.gefchina.org.cn/assembly/file/Projects\\_in\\_china.doc](http://www.gefchina.org.cn/assembly/file/Projects_in_china.doc) and <http://www.gefonline.org/projectList.cfm>.

17 See, for example, Project Management Office (PMO), World Bank/GEF China Energy Conservation Project, State Economic and Trade Commission, Progress Report 2002.

18 For more information on the GEF China refrigerators project, refer to the PMO's *Information Center on China Efficient Refrigerator Project*. Available online at: <http://www.r-gefchina.org.cn/news/index.htm>

development; capacity building; and public outreach and education. The project addressed both the supply and demand sides of the market for efficient refrigerators. The project was viewed as important for increasing pressure on the market for more efficient refrigerators and assisted in establishing national energy efficiency standards for refrigerators (Birner and Martinot, 2005). The project received considerable attention in the media and exposure through establishing an information dissemination center, as well as initiating a design price to encourage innovation. The negative aspects of the project include the lack of transfer of technical know-how, and access to foreign manufacturers. Also, changes in the market for price competition were not envisioned in the project design.

A new programmatic approach is applied in the UNDP-implemented China End-Use Energy Efficiency Project (EUEEP). The programmatic approach modality<sup>19</sup> would provide longer-term financial support through country-based programs, “which would go beyond the scope of an individual project to support an integrated set of projects” (Christoffersen *et al.*, 2002). The EUEEP project supports the first phase of a four-phase, 12-year strategic plan developed by the Chinese government to dramatically improve the efficiency of its major end-use sectors, buildings and industry. The objectives of the project are to outline a strategic approach to developing, implementing and enforcing a comprehensive and effective energy conservation policy and regulatory system in line with the objectives of the Energy Conservation Law of 1998. The principal elements of the project include: policy and regulatory issues; institutional/capacity issues; technical barriers; financial resources; and information dissemination. Developing policies, standards, codes, labels and taking other actions to implement the Energy Conservation Law are important aspects of the project:<sup>20</sup>

- issuing guidelines for energy-efficient end-use products;
- amending energy efficiency design codes for new industrial facilities;
- adopting incentive policies to introduce new/advanced technologies and to encourage compliance with energy efficiency standards and codes;
- promotional policies for energy-efficient appliances and equipment (e.g., Energy Star certification);
- new and revised standards and codes for new residential/commercial buildings and new codes for existing buildings;

---

19 The *programmatic* approach aims to provide “phased and sustained support for the implementation of a multi-year (medium- to long-term) program that serves to better integrate global environmental objectives into national strategies and plans,” (e.g., biodiversity strategies, sustainable energy plan, etc.) (GEF 2002).

20 See the GEF project document on the China End-Use Energy Efficiency Project: <http://gefonline.org/projectDetails.cfm?projID=966>



- technical specifications for building materials and equipment (e.g., doors/windows, insulation, heat pumps, district heating, materials);
- building rating and labeling systems;
- certification and labeling of energy-efficient industrial products;
- policies for retrofit of existing commercial and residential buildings;
- voluntary agreements with enterprises to reduce their energy consumption by taking energy efficiency measures; and
- assessing and preparing guidelines for building EE equipment (A/C, heat meters, building envelop).

GEF provides US\$17 million for the first three-year period (US\$31 million in co-financing from the Chinese government and US\$32 million from the Chinese business sector for technical renovation). The EUEEP project aims to promote energy efficiency in the building and industry sectors—key energy consuming sectors in China—and began implementation in 2005. It is a 12-year program to improve energy efficiency while reducing emissions; carbon emissions reductions of approximately 12 million tons will be reduced on a cumulative basis (equivalent to over 42 million tons of CO<sub>2</sub>). This will be achieved by reducing energy consumption in the targeted sectors by nearly 19 million tons of coal equivalent (Mtce) over this three-year period. The project is still in an initial phase and it is therefore premature to draw conclusions about achievements. The programmatic approach ensures long-term support.

Lessons from implementation of GEF projects in China illustrate that there are some international and domestic challenges to be overcome in the application processes and procedures, and in implementation. The GEF structure and process are viewed by Chinese stakeholders as highly political; they believe that ways should be explored to insulate the new fund from political tensions. Moreover, they consider the GEF project development cycle to be far too long, e.g., three years in the case of the UNDP EUEEP. The Country Assessment of GEF Activities in China, prepared for MOF by the China GEF office in 2004, concluded that GEF projects have not contributed as much to technology transfer as anticipated. In the above-mentioned two projects (boilers and refrigerators) foreign suppliers of technical know-how were not eager to provide Chinese manufacturers with information. Moreover, institutional problems occurred on the Chinese side during central government administrative reforms, which included the abolishment of several industrial ministries, including the Ministry of Machinery Industries (Birner and Martinot, 2005). In addition, in the China industrial boiler project, the long process of license procurement for technology had a negative impact on the project (more on this project in Chapter 4).

Implementation of GEF projects in China depends on Implementing Agencies as well as domestic agencies. The World Bank is the dominant implementing agency, contributing more than 70 per cent of all GEF funding in China. UNDP is the most active player in terms of number of projects, but they are much smaller than the World Bank projects. Chinese actors view the World Bank and UNDP differently.<sup>21</sup> The World Bank is viewed as more effective and action-oriented, albeit less receptive to Chinese demands. UNDP scores lower in terms of effectiveness but higher in terms of legitimacy. Both are viewed as bureaucratic; the World Bank to a lesser extent, although burdensome procurement rules and procedures were a barrier in the boiler project.

On the domestic side, the Chinese bureaucratic system seems more streamlined than it actually is, and there are serious coordination problems both horizontally and vertically. Lack of cooperation, problems of information-sharing, and institutional turf battles among the numerous actors are common and could impact negatively on the implementation of GEF projects.

### **3.3 Possibilities for Regional Cooperation**

Given the nature of regional institutions—designed to coordinate at a high level among governments of multiple countries—it is not surprising that energy efficiency cooperation at a regional level in East Asia has focused mainly on policy discussions and coordination. Compared to economic issues, and even energy issues, energy efficiency appears as a relatively small agenda item in regional dialogue. Among energy issues, energy security in the region receives the most attention, particularly how to secure stable supplies of oil and natural gas. Thus strategies for oil stockpiling, coordination of expanding natural gas pipeline infrastructure and expanding facilities for transport of liquefied natural gas (LNG) are major topics for discussion.<sup>22</sup> There is common interest in energy efficiency, as reflected in regional agendas and plans, but supply-side aspects of energy security have thus far received much more attention.

The two main regional organizations are the Association of Southeast Asian Nations (ASEAN)—with various permutations involving the three large economies in Northeast Asia (Japan, China and South Korea)—and the Asia Pacific Economic Cooperative (APEC), an even larger grouping of countries around the Pacific Rim. Energy efficiency cooperation activities carried out under the auspices of these organizations are summarized in Table 3.3. Selected cooperation efforts are described in further detail below, emphasizing the organizational structure of the cooperation.

---

21 The third IA, UNEP, is not involved in climate change or energy projects in China; UNEP GEF projects focus mainly on nature conservation and biodiversity.

22 Based on dialogues of the APEC EWG, ASEAN ACE and Northeast Asia.

**Table 3.3. Regional cooperation on East Asian energy efficiency.**

Cooperation activity	Type of cooperation	Target sector	Lead organizations	Timeframe
ASEAN Plans of Action for Energy Cooperation (APAEC)	PD, CB	Government, industry, appliances, ESCOs, transport	ASEAN Center for Energy (ACE) and EE&C-SSN	1999–2004; 2004–2009
ASEAN +3	PD	Government (National Energy Policies)	ASEAN +3 Energy Policy Governing Group	2002–present
ASEAN-EC Cogen Program Phase 3	TD, TA, MD	Co-generation power	ASEAN: Asian Institute of Technology (Thailand); EC: Carl Bro International (Sweden)	January 2002–December 2004
ASEAN-Japan (SOME-METI)	PD, TA	Buildings, industry	Japan: METI, EJCC; ASEAN: EE&C-SSN, SOME	2000–present
ASEAN Energy Policy and System Analysis Project	TA, PD	Government, transport, electric power, fuel supply	ASEAN; Australia: AusAID	2000–2005
APEC EWG Operational Plan	PD, CB	Government (National Energy Policies)	APEC Energy Working Group (EWG)	2003–present

**Key: Form of Cooperation:** CB = Capacity Building; PD = Policy Development; MD = Market Development; TA = Technical Assistance; TD = Technology Development.

The Association of Southeast Asian Nations (ASEAN) was established in 1967 by five original member countries. Today there are 10 members.<sup>23</sup> The aims and purposes of ASEAN are to accelerate the economic growth, social progress and cultural development in the region, and to promote regional peace and stability. Some of the earliest economic cooperation schemes of ASEAN were aimed at increasing intra-ASEAN trade, including the launching of an ASEAN Free Trade Area, or AFTA.

At present, ASEAN economic cooperation covers 12 areas, one of which is energy. An ASEAN Center for Energy (ACE) was established as an intergovernmental organization to serve as a catalyst for the economic growth and development of the ASEAN region. This is achieved by initiating, coordinating and facilitating regional, as well as joint and collective, activities on energy that promote the environmental sustainability of the region. ACE now facilitates and coordinates the work of the Energy Efficiency and Conservation Sub-sector Network (EE&C-SSN), a body established in 1997 to coordinate ASEAN's energy efficiency activities. Funding for the ACE is provided by an Energy Endowment Fund established from equal contributions of the 10 member countries.

Since its establishment, ACE has been instrumental in preparing two ASEAN Plans of Action for Energy Cooperation: one for the period 1999–2004, and one for 2004–2009. The 1999–2004 plan includes four strategies. The 2004–2009 plan includes six strategies and 25 actions.

<sup>23</sup> ASEAN members are Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.

One example of ASEAN energy strategies is the development of a voluntary standard endorsement label for energy-efficient products, starting with magnetic ballasts for lighting (see Figure 3.2). Since 1997, with the Philippines as the project leader, the ACE and EE&C-SSN have held workshops, conducted study tours, and shared national information among member countries. They have conducted an appraisal of the ASEAN lighting ballast market, coordinated comparative testing of magnetic ballasts, developed a common testing procedure for magnetic ballasts and evaluated alternative endorsement label designs in support of the ASEAN labeling system. Individual member countries will develop their own national guidelines to implement the label and to ensure that the label is properly used and attached to products made by manufacturers accredited by proper authorities in the member countries. When work on the label for magnetic ballasts is complete, ACE and EE&C-SSN are planning to turn their attention to labels for refrigerators and air conditioners, with Thailand leading the effort.

**Figure 3.2. Regional endorsement label adopted by ASEAN for energy-efficient products.**



### ASEAN+3 energy cooperation

In the Senior Officials on Energy Meeting (SOME) of the 20th ASEAN Ministers on Energy Meeting, ASEAN energy officials formally established closer energy cooperation with their counterparts from China, Japan and Korea. They held the First SOME + 3 Consultations in Bali in June 2002, which served as a venue for high-level policy discussions and exchanges of relevant information in the field of energy in East Asia. In September 2002, during the Eighth International Energy Forum held in Osaka, Japan, the ASEAN+3 Energy Ministers reached a common understanding on a five-point initiative for “Energy Cooperation among Japan, China, Korea and ASEAN,” which comprised the following: (a) creation of emergency network; (b) development of oil stockpiling; (c) joint studies on the ASEAN oil market; (d) improvement of natural gas development; and (e) improvement of energy efficiency and renewable energy.<sup>24</sup>

---

<sup>24</sup> ASEAN Plan of Action for Energy Cooperation (APAEC) 2004–2009. Available online at: <http://www.aseansec.org/pdf/APAEC0409.pdf>

At another meeting in Manila in June 2004, the Energy Ministers of ASEAN+3 adopted a joint statement titled “Forging Closer ASEAN+3 Energy Partnership.” It consists of 14 paragraphs, with paragraph 13 being a statement on energy efficiency and conservation that says: “We acknowledge the vital importance of energy efficiency and conservation for our region where rapid increases in energy demand are expected in the future, and we share the view that greater effort for energy efficiency and conservation will be necessary.”<sup>25</sup>

### METI’s “Asian Energy Partnership Plan”

The Japanese Ministry of Economy, Trade and Industry (METI) associates ASEAN+3 cooperation with its Asian Energy Partnership plan. The plan is a major pillar of Japan’s international energy strategy toward the year 2030, as stated by the Minister’s advisory committee for natural resources and energy.<sup>26</sup>

### APEC Energy Working Group (EWG) and Expert Group on Energy Efficiency and Conservation (EGEE&C)

The 21-member Asia Pacific Economic Cooperative (APEC) was established in 1989 to further enhance economic growth and prosperity for the region and to strengthen the Asia-Pacific community.<sup>27</sup> Although APEC member economies represent vastly differing cultures and levels of economic development, members have worked together since APEC’s inception to reduce tariffs and other trade barriers across the Asia-Pacific region, creating efficient domestic economies and dramatically increasing exports.

In the years after its formation, APEC created an action agenda with 15 specific areas that needed to be undertaken including “Standards and Conformance,” which the agenda targeted with the following four goals:

1. ensure the transparency of the standards and conformity assessment of APEC economies;
2. align APEC economies’ mandatory and voluntary standards with international standards;
3. achieve mutual recognition among APEC economies of conformity assessment in regulated and voluntary sectors; and

---

25 For more information on the 2004 ASEAN+3 Energy Ministers meeting, see: <http://www.aseansec.org/16144.htm>

26 For more information on METI-ASEAN activity, see: <http://www.enecho.meti.go.jp/english/new/040428.htm>

27 APEC’s 21 member economies are Australia; Brunei Darussalam; Canada; Chile; People’s Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; the Republic of the Philippines; the Russian Federation; Singapore; Chinese Taipei; Thailand; United States of America; Vietnam. See: <http://www.apecsec.org.sg/>

4. promote cooperation for technical infrastructure development to facilitate broad participation in mutual recognition arrangements in both regulated and voluntary sectors.

While APEC established an Energy Working Group (EWG) in 1990 as one of 10 sectoral groups, the Energy Ministers of the APEC economies met for the first time only in 1996. At this meeting, the Ministers embraced APEC's new action agenda and instructed officials from member economies to work together to achieve the benefits of increased cooperation on energy standards by:

- developing firm proposals for establishing a base on which mutual acceptance of accredited test facilities and standard test results obtained at these facilities (could) be achieved;
- working towards the establishment of bases for the direct comparison of the outcomes of testing to different standards so that the need for testing to multiple standards (could) be reduced or removed; and
- developing a general policy framework that would allow for progressive development and implementation on a bilateral or multilateral basis, product by product, as technical details (were) established and mutually agreed.

The EWG formed an Expert Group on Energy Efficiency and Conservation (EGEE&C) with a general mission “to advance economic and social well-being in the Asia-Pacific region through energy conservation and the application of energy-efficient technologies.” In 1996, EWG created a separate ad hoc APEC Steering Group on Energy Standards (SGES) to design a general policy framework to guide future energy efficiency standards related work within APEC economies.

In 2000, SGES submitted its report to EWG, completing its mandate and recommending that EGEE&C implement the proposed framework. The report concluded that the successful implementation of the general policy framework requires the active participation by member economies in future APEC workshops and international standards processes. It also requires the existence of an infrastructure that will create transparency of action on the development and use of energy efficiency testing procedures and that will monitor and coordinate related activities in the APEC region. The SGES concluded that in order for the framework to be implemented effectively, a Web-based Standards Notification Procedure needed to be established and an APEC Energy Efficiency Test Procedures Coordinator should be appointed (SGES, 2000).

At their second meeting in 1998, APEC Energy Ministers endorsed the establishment of a Standards Notification Procedure and agreed to consider other new programs related to energy efficiency testing procedures. The subsequent meetings of the energy ministers to date have all provided further encouragement and guidance to EGEE&C for its standards and labeling initiative.

Since 2000, EGEE&C has conducted workshops and seminars; prepared reports; shared information among members about the progress of S&L at its twice-a-year business meetings; and established the Web-based Energy Standards Information System (ESIS)<sup>28</sup> in partnership with CLASP (see discussion in Chapter 4). A series of vision workshops were sanctioned by EGEE&C and hosted by the Australian Greenhouse Office on three continents in 2003 and 2004 to develop a consensus vision reported in *A Strategic Vision for International Cooperation on Energy Standards and Labeling*. While its S&L activity has been predominant, EGEE&C has conducted activities in other aspects of energy efficiency, most recently focusing on financing for energy efficiency and on public sector procurement of energy-efficient products.

The progress in collaboration among its member economies that APEC has been able to achieve over the past decade is due to a combination of dedicated people and ongoing reliable funding. Just three high-energy individuals committed to S&L have provided expertise and enthusiasm to create and maintain the primary momentum for the energy efficiency initiative. Support from over two dozen dedicated and competent representatives from member economies has contributed to the initiative's viability. Importantly, the venture was facilitated by APEC's robust mechanism for funding such initiatives. By annually making ample project funds available from member economy contributions, and by sponsoring member economy self-funded projects, APEC provided funding for participant travel to the workshops and for the development and maintenance of the ESIS Web site. Without any one of these three components, much of the APEC support for S&L would not likely have happened. Also, without the initial mandate from the highest levels within the member economies and specifically from their Energy Ministers, the initiative would not likely have gained the traction that it has (Wiel and Lebot, 2006).

### **3.4 A New Model: Independent, International Cooperation Networks**

Independent international organizations leverage expertise by forming networks across countries and organizations, including government, industry, financial institutions, research institutions and non-profit organizations. The Energy Foundation's China Sustainable Energy Program (CSEP); the expanding network under the umbrella of the Renewable Energy and Energy Efficiency Program (REEEP, a spin-off of U.K. efforts); and the appliance-focused Collaborative Labeling and Appliance Standards Program (CLASP, a spin-off of the Lawrence Berkeley National Lab in the U.S.) are examples of these network-based organizations (see Table 3.4). International independent organizations favor cooperation in the form of capacity building and policy development, targeting their limited funds toward experts and organizations

---

28 See the ESIS Web site at <http://www.apec-esis.org>

that can achieve large-scale energy efficiency improvements by promoting policy action. Below we describe the structure and accomplishments of two of these networks: CSEP and CLASP.

**Table 3.4. Independent international cooperation on East Asian energy efficiency.**

Cooperation activity	Type of cooperation	Target sector	Lead organizations	Timeframe
Energy Foundation: China Sustainable Energy Program (CSEP)	PD, CB, MD, TA	Buildings, transport, industry, appliances, electric power, finance	U.S.: Energy Foundation, LBNL, others; China: NDRC, ERI, CATARC, CNIS, others	1999–present
CLASP-China	TA, PD	Appliances	CLASP; China: CNIS, others	2002–2005
CLASP-ASEAN	TA, PD	Appliances	CLASP, ASEAN EE&C-SSN	2004–2005
CLASP-APEC	TA, PD	Appliances	CLASP, APEC EWG	2002–2004
PePS-China	TA, PD	Appliances, government/public	PePS, LBNL; China: CECP, NDRC	2002–2007
REEEP-China: Innovative (Energy) Project Fund, ESCOs and others	PD, CB, MD, PR/Ed	Electric power, government, buildings, industry, banks	REEEP, GEI, Rabobank (Netherlands), LaGuardia Foundation; China: CECIC, Chongqing University; U.K.: Cambridge University	2003–present
Alliance to Save Energy: China Energy Efficiency Industry Partnership	PR/Ed, MD	Industry, residential, hotels, hospitals, utilities	Alliance to Save Energy; China: CECA, various Chinese agencies	1997–2004

**Key: Form of Cooperation:** CB = Capacity Building; PD = Policy Development; MD = Market Development; PR/Ed = Public Outreach/Education; TA = Technical Assistance; TD = Technology Development.

### Energy Foundation – China Sustainable Energy Program (CSEP)

Launched in 1999, the China Sustainable Energy Program (CSEP) is a grants initiative for the promotion of energy efficiency and renewable energy that focuses on policy development cooperation. Managed by the Energy Foundation, a non-profit organization with offices in San Francisco and Beijing, CSEP awards ~US\$7.5 million in grants annually. By funding Chinese institutes and international policy practitioners to work together, CSEP fosters the sharing of international best practices and the development of policies suited to local conditions. CSEP promotes the development of policies and implementation mechanisms in six program areas: buildings; transportation; industry; electricity utilities; renewable energy; and low-carbon development paths.<sup>29</sup>

One key reason for the effectiveness of CSEP's policy development cooperation is that guidance is provided by two high-level Chinese advisory groups: a Senior Policy Advisory Council composed of minister-level officials; and a group of Dialogue Partners composed of directors-general of pertinent ministries. These advisory groups set the direction of CSEP, such that policy

<sup>29</sup> For further details, see the Energy Foundation CSEP 2005 brochure, the Energy Foundation's 2004 Annual Report and the program's Web site at <http://www.efchina.org>



development activities are politically salient. CSEP funding is then channeled to the ministry-affiliated research institutes that typically do the work of developing national policies. Since Zhu Rongji's administrative reforms in the late 1990s, which dramatically reduced the number of officials in China's central government agencies, research institutes have played an increasingly important role in policy development in China. The "top-down" national policy efforts are then complemented by "bottom-up" pilot initiatives at the provincial and local levels, where implementation mechanisms can be tested and strengthened.<sup>30</sup>

Another organizational aspect that contributes to the success of the China Sustainable Energy Program is its Beijing office. Staffed with full-time Chinese energy experts, the office facilitates close connections to policy developments in Beijing and elsewhere in China. While many organizations have set up Beijing offices to have a presence in China, they often hire local support staff but send managers or technical staff from home offices; as a result, they may be less involved with local developments. The Energy Foundation Beijing office also provides a place to meet decision-makers and work cooperatively with international practitioners.

Achievements of the China Sustainable Energy Program include the (Energy Foundation, 2004):

- Development of residential and commercial building codes for Central and South China, which were launched in 2005 and are estimated to save as much as 49 million tons of carbon by 2020, reducing the need for 23 large (1,000 MW) coal-fired power plants.
- Development of vehicle fuel economy standards, which were launched in September 2004 and are estimated to save 212 million barrels of oil—the equivalent of removing 25 million cars from the road—and save 23 million tons of carbon by 2020 (see further discussion in Chapter 6).
- Development of efficiency standards for appliances, including refrigerators, air conditioners, washing machines and televisions. Put into law over the past five years, these standards are estimated to cut 30 million tons of carbon emissions and displace 17 large (1,000 MW) coal-fired power plants by 2020.

In choosing the cooperation efforts it will fund, the Energy Foundation requires that applicants identify decision-makers who will be targeted by the effort. Applicants must also spell out the typical information required for a proposal: the problem to be addressed, strategy, timeline, budget and expected results. In addition, applicants must indicate how the success of their efforts

---

30 Discussion with Doug Ogden, Director of Energy Foundation's CSEP, San Francisco, December 2005.

will be measured. The Foundation’s Board of Directors meets three times a year to review applications and select efforts to fund. The Energy Foundation’s emphasis on targeting specific decision-makers and on measuring success has led to impressive results. Through the approach just described, CSEP turns US\$7 million per year into savings of hundreds of millions of tons of carbon and other air pollutants. The program’s emphasis on joint policy development also serves to strengthen the capabilities of staff in Chinese institutes and agencies, which further assists in “China’s transition to a sustainable energy future” (Energy Foundation, 2004).

### Collaborative Labeling and Standards Program (CLASP)

The Collaborative Labeling and Standards Program (CLASP) was founded as a partnership in 1999 to consolidate the separately-funded USAID projects of its three founding organizations: the Lawrence Berkeley National Laboratory; the Alliance to Save Energy; and the International Institute for Energy Conservation. It has evolved as originally planned into a global network, a collection of standards and labeling (S&L) experts, a business opportunity for implementing partners, an information clearinghouse, and an aide to donor organizations—and it performs many other functions as well. In 2005, CLASP became a non-profit corporation and enhanced its capability to provide S&L assistance through an innovative partnership structure described below. It is open to all organizations and individuals who have the ability and interest to serve CLASP’s mission and are willing to abide by CLASP’s “Guiding Principles.”<sup>31</sup>

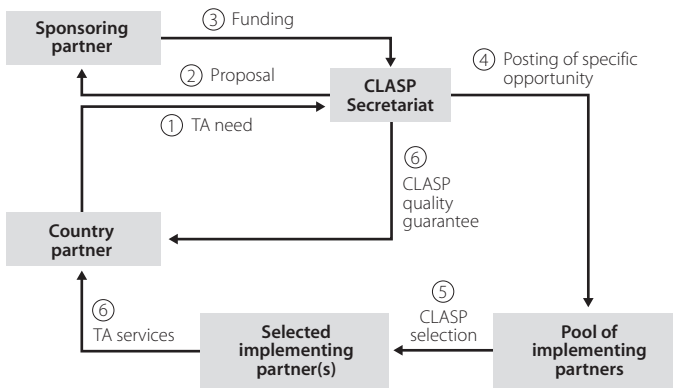
CLASP provides the world’s best experts in every aspect of S&L. They, in turn, collaborate with partner governments to apply the world’s best S&L practices to assure these country partners a lower national energy bill and large amounts of low-cost carbon reductions over the next several decades. CLASP management guarantees technical quality and innovation to its sponsors and country partners.

Organizationally, CLASP is comprised of a small secretariat and a worldwide assembly of: sponsoring partners who fund CLASP activities; country partners who are the recipients of CLASP services; implementing partners who provide CLASP services; and interested stakeholders and affiliates. CLASP is governed by a Board of Directors comprised of 12 voting members from eight countries on four continents who are responsible for all aspects of the partnership. CLASP’s operational model is illustrated in Figure 3.3. When funding is received, CLASP surveys its implementing partners to assemble the best team of experts possible. Rather than hiring organizations to conduct the project’s tasks, CLASP assigns individuals to project teams—an organizational approach that differs from most others’.

---

31 CLASP’s Guiding Principles are available at: <http://www.clasponline.org/partnership.php?nrx=2&no=5>

Figure 3-3. Operational flow of the Collaborative Labeling and Standards Program (CLASP).



Since its inception, CLASP’s most significant activities and accomplishments have been its support for:

- labels and Minimum Energy Performance Standards (MEPS) for a range of products in China;
- a first-ever MEPS in India (for refrigerators);
- label development and labeling program launch in India for several products, but particularly support for launching endorsement labeling of consumer electronics;
- label development and labeling program launch in South Africa;
- an assessment of the energy and carbon savings from MEPS for four products in Mexico;
- regional initiatives in APEC, ASEAN, Andean and Central America;
- development of the CLASP S&L Guidebook (available in four languages);
- development of the CLASP Web site (<http://www.clasponline.org>); and
- development of CLASP’s policy analysis calculator (PAMS).

CLASP is registered as a UN Sustainable Development Partnership which enhances: (1) its ability to co-fund and leverage projects; (2) its ability to assemble quality teams of S&L experts; and (3) the cooperative relationship it establishes with its partner country governments. CLASP is also a co-sponsor of the APEC Energy Standards Information System (ESIS) Web site (<http://www.apec-esis.org>), which further enhances its relations with APEC economies and its ability to provide comprehensive information on the world’s S&L programs.

### **3.5 Conclusions: The Growing Role of Independent Cooperation Networks**

This overview of the organizational arrangements of East Asian energy efficiency cooperation shows the strengths and weaknesses of each kind of organization and the role that each can play.

From bilateral cooperation—especially Japan-China interaction—we find that two countries can sometimes move quickly and find specific things upon which to agree. But bilateral cooperation on energy efficiency can also be side-tracked by other political issues in the relationship. For example, the Green Aid Plan policy dialogues were stopped due to high-level political tensions and disagreement over the connection between the GAP and the CDM. In addition, the form of cooperation is influenced by the overall shape of relations between the two countries. For Japan and China, the focus has been on technology transfer and technical assistance, while policy and market cooperation activities have been avoided.

From cooperation experience with multilateral institutions, we find that these institutions have well-established organizational connections and command significant resources. As a result, multilateral cooperation can support large projects. However, the process is often slow and inflexible, making it difficult for recipient countries to seize windows of opportunity and sustain their participation.

From regional energy efficiency cooperation through ASEAN and APEC, we learn that some energy efficiency issues have more widespread appeal than others. It can be hard to get something on the agenda unless many countries consider it a high priority. For example, several countries are involved in manufacturing appliances and all are large markets for appliance sales; thus cooperation on appliance energy efficiency is appealing from a regional perspective. In contrast, interest in steel industry energy efficiency is limited to a smaller group and may be better addressed through bilateral or multilateral dialogues. For those efficiency efforts that are given attention by ASEAN and APEC, three important factors for success were identified: high-level mandate and support; ongoing reliable funding; and dedicated people.

Finally, we learned several lessons from independent international cooperation networks. These networks, including CSEP, CLASP and REEEP, can work around political sensitivities since they are not representing governments. Their focus is on problem-solving with dedicated experts who have more flexibility than those in larger, government institutions. With limited budgets, independent organizations have sought to maximize their impact by focusing on policy development cooperation. These independent networks also interact with bilateral, multilateral and regional organizations to build on each other's strengths and to accomplish more.



# Chapter 4

## Cooperation Mechanisms: A Shift Toward Policy Development Cooperation

By Stephanie Ohshita

As humankind tries to address the climate change problem, we find the need to look upstream—to change the ways in which we use energy—and the need for more programmatic or systems-oriented approaches. To achieve significant energy savings, we need cooperation mechanisms that can spur widespread improvements in energy efficiency and conservation. These mechanisms must address large quantities of energy, have significant impact and induce lasting change. Project-based technology cooperation only gets us so far in that effort; only a limited number of projects can be conducted with public funds. To achieve widespread improvements, we need something more; we need policies that promote investments of private funds in energy efficiency and energy conservation across multiple economic sectors. In international cooperation on energy efficiency, there is an important trend of increasing efforts to support the development of policies that promote the conservation and efficient use of energy. Policy development cooperation is an effective use of limited funds, in that it creates a top-down push and an enabling environment for widespread investments in energy efficiency, all from a relatively small investment of public funds.

This chapter first characterizes different forms of cooperation on energy efficiency occurring in East Asia and offers a definition of policy development cooperation. Lessons from technology cooperation—a dominant form of cooperation in the past and present—are then discussed. Next, an overview of current policy development cooperation on energy efficiency in East Asia is provided, along with analysis of how policy development cooperation works and the key factors contributing to its success.

### 4.1 Forms of International Cooperation on Energy Efficiency and Conservation

In reviewing existing efforts on energy efficiency and conservation cooperation in East Asia, we identified six main forms of cooperation:

1. **Policy Development Cooperation:** support for the development of goals, laws, standards, implementing regulations and guidance documents; involves expert exchange, joint work and high-level decision-makers.
2. **Market Development Cooperation:** creation of financial incentives for technology investments, information exchange among firms, information

campaigns to raise public awareness and desirability of efficiency products, etc., that directly intervene in the operation of the market.

3. **Technical Assistance:** support for project background studies, feasibility studies and project design; may also include the provision of experts to conduct analysis or provide other support for programs or policies.
4. **Technology Development Cooperation:** technology transfer, technology demonstration, promotion of technology innovation, technology license purchase and technology R&D.
5. **Capacity Building:** information exchange, establishment of a new organization or center, support for staff at existing organizations, and training for managers and technical staff of industrial enterprises.
6. **Public Outreach and Education:** support for public information campaigns, the development and use of databases and Web sites, and training.

Definitions of different forms of cooperation vary among development agencies and other organizations, and often are not explicitly defined. For example, ADB requires a Technical Assistance (TA) activity—typically meaning a feasibility study—before a large project loan will be issued. Other organizations use the term Technical Assistance more broadly, encompassing provision of experts for assistance with technology installation or training as well as for assistance with policy development. There may be some overlap among these forms of cooperation, e.g., policy development cooperation that also builds capacity or creates financial incentives. The definitions offered here reflect the use of terminology at the OECD, the World Bank, ADB, GEF, JBIC and JICA, the Energy Foundation, CLASP and other organizations cooperating on energy efficiency in East Asia.

Out of these forms of cooperation, we want to highlight the increasing utilization and effectiveness of cooperation on policy development for the promotion of energy efficiency. What do we mean by *policy development cooperation*? Is it really new? International *sharing of “best practices”* in policy is not new; it has been occurring for many years in various ways across a variety of policy arenas, from monetary policy and industrial policy to environmental policy. Governments may send analysts on study tours or hold workshops to understand policy design and implementation experiences in other countries. For example, in developing its environmental policies in the 1970s, the Japanese government sent agency staff to the U.S. and Europe to learn about different policy mechanisms being employed to curb pollution.

In the context of development aid, governments engage in *policy dialogue* in conjunction with technology development projects. For example, policy dialogue (*seisaku taiwa*) is a component of Japan’s Green Aid Plan. At annual or bi-annual meetings, counterpart ministries in Japan and the host country meet to discuss the host country’s policy priorities and which GAP technology

projects would best fit those priorities (Ohshita, 2003). The GAP policy dialogues were not aimed at modifying existing policies or developing new policies; rather, they involved identifying priorities. Other definitions of policy dialogue emphasize persuasion or coercion—situations where a country or a development bank tries to persuade another country to undertake new policies or policy reform. For example, the World Bank has been promoting energy pricing policy reform in conjunction with its lending, while USAID has added energy efficiency goals as part of its lending criteria. At its most coercive, policy dialogue has been used as a way of forcing aid recipients to adopt certain policies under the rubric of loan *conditionality*—with notable instances of disastrous results.<sup>1</sup>

What distinguishes *policy development cooperation* from the activities above is the following: (a) the nature of the resources provided; (b) the intent to develop new policy; and (c) the relationship among the parties involved (i.e., who is initiating and who is supporting the policy development). With policies developed and adopted under *conditionality*, the aid donor is forcing the policy and the relationship is highly unequal, with the balance of power skewed toward the donor. In *sharing of best practices*, the country developing the policies may be taking the initiative—and paying for the initiative itself. The knowledge of other countries' policy experience is taken back and the country's own staff use the acquired knowledge in their policy development. Under *policy dialogue*, there may or may not be development of new policy. The dialogue may simply involve information sharing with the aim of creating a better understanding among those engaged in the dialogue. Or one party may be pushing another party to take certain policy actions. Parties to the dialogue may or may not take any new policy action as a result.

What we have observed as *policy development cooperation* in examining East Asian energy efficiency and conservation cooperation is: (a) the provision of funds and experts; (b) to a country wanting to promote energy efficiency and conservation; and (c) to engage in joint analysis and formulation of policy, as well as gain assistance with initial implementation. Policy development cooperation goes beyond policy studies. It involves the collaborative work of taking policy experience from elsewhere, bringing knowledge of the domestic situation (in terms of institutions, technology, political economy, etc.), and formulating viable measures to promote energy efficiency and conservation—measures that are actually adopted and implemented.

Perhaps more interesting than the above definition are the achievements obtained through policy development cooperation. Relatively small amounts of funding can lead to substantial energy savings. For example, building

---

1 The Asian financial crisis in the late 1990s is one example of unintended negative consequences of aid conditionality. For more information on policy dialogue and conditionality in the environmental context, see Fairman and Ross (1996).



efficiency standards enacted in China through Energy Foundation support are estimated to displace the need for 50 large (500 MW) coal-fired power plants by 2020. Appliance standards created through the program are estimated to have a similarly large energy savings, equivalent to 51 large coal-fired power plants during the same time period (Energy Foundation, 2005). Cooperative work on those standards has helped strengthen the institutes and agencies that administer them. It has increased capabilities among appliance manufacturers and retailers. There are also signs of growing awareness of energy efficiency among consumers.

The rest of this chapter analyzes experience with other forms of energy efficiency cooperation—especially technology cooperation—to highlight some of the limitations and illustrate the motivation for policy development cooperation. The chapter then elaborates on current experience with policy development cooperation and discusses the potential for future efforts to promote energy efficiency and conservation in East Asia.

## **4.2 Lessons Learned from Technology Cooperation and Development Assistance**

The 1990s witnessed a downward trend in official development assistance (ODA) with an upturn at the end of the decade. During the same period, private sector financing—including foreign direct investment (FDI), commercial lending and equity investment—increased substantially, eclipsing ODA as the means of technology acquisition by developing countries. Private technology-based investments have been concentrated in the industry, energy supply and transportation sectors of developing East Asian and Latin American countries (Metz *et al.*, 2000).

The use of ODA—especially bilateral assistance—for technology transfer has had decidedly mixed results. Installation of crucial infrastructure with ODA—such as electric power supply, transit systems or water treatment facilities—has helped to enhance economic development. Yet, rarely have technologies been chosen based on energy or resource efficiency. Seldom is know-how transferred along with the equipment. Far too frequently, technologies transferred through ODA efforts do not spur changes beyond the funded project; benefits are typically limited to the scope of the project.

Considering the relative amount and direction of private investment, and the mixed record on development assistance for technology transfer, ODA would be well directed toward programs seeking to leverage private investment and create supportive policies and institutions for the diffusion of more efficient, less polluting technologies. For those sectors and countries not targeted by private financing, ODA is more crucial for technology acquisition. Even in those sectors and countries, ODA would still be well directed toward the creation of enabling environments (e.g., policy development, institution strengthening,

training programs, etc.) for the spread of cleaner and more efficient technologies (Metz *et al.*, 2000).

The two energy efficiency cooperation efforts described below—Japan’s Green Aid Plan in East Asia, and the GEF-World Bank Industrial Boiler Project in China—illustrate strategies and experience with cooperation in the form of technology development. These examples highlight the challenges and limitations of technology cooperation. We want to emphasize that cooperation focused on improving technology is extremely important and very much needed. But to do this effectively, we need more than equipment—we need policies and incentives to create a receptive environment for technological change.

### Technology cooperation under the Green Aid Plan (GAP)

Japan’s Ministry of Economy, Trade and Industry (METI, formerly MITI) launched its Green Aid Plan (GAP) in 1992 to promote the introduction and dissemination of cleaner energy technology in Asian developing countries. Two main groups of technologies are promoted by GAP: (1) industrial energy-efficient technologies (e.g., heat recovery technologies and coke dry quenching); and (2) cleaner coal technologies or CCT (e.g., circulating fluidized bed boilers with sulfur removal and flue gas desulfurization). Selection of specific technologies and projects is made through policy dialogue between METI and their counterpart government agency in the recipient country. Key criteria in technology choices are consistency with host-country policies and priorities, and the availability of technologies from Japanese industry (Energy Foundation, 2005).

Under the Green Aid Plan, METI provides public funds to Japanese firms to modify and demonstrate their technologies at enterprises in recipient countries. METI also provides funds to Japanese industrial associations and training organizations to conduct feasibility studies and training on the operation of the Japanese technologies. Recipient enterprises are granted ownership of the equipment, but are responsible for necessary on-site modification of their facilities and for ongoing operation and maintenance costs.

The GAP retrofit approach differs from most other international efforts on improved energy technology transfer because of its focus on existing enterprises. Typically, multilateral or bilateral aid is provided for the construction of large, new enterprises, which may include energy-efficient technology or pollution control equipment.<sup>2</sup> The program’s focus on the industrial sector, rather than the power sector, also differs from much of the aid and commercial activity in China

---

2 For a discussion of the lending pressures of bilateral and multilateral institutions, with a focus on East Asia, see, Evans, 1999; and Rix, 1980 and 1993.

and other East Asian countries. Projects involving retrofits at existing industrial enterprises are often too small to attract international aid.<sup>3</sup>

The Green Aid Plan's approach of government dialogue and demonstrating retrofits enjoyed some success during the 1990s. In China, which has hosted roughly 80 per cent of the GAP's projects, 18 energy efficiency demonstration projects and 11 CCT demonstration projects were completed. This effort, representing a few hundred million U.S. dollars during the 1990s, is the world's largest bilateral cooperation effort on industrial energy efficiency to date, and is yielding energy savings of roughly 4,200 TJ/year.<sup>4</sup> Chinese officials suggest that GAP cooperation on cleaner and more efficient industrial technologies served to raise awareness of pollution impacts and of the technologies needed to address them.

However, there have been no direct follow-on orders for cleaner coal technologies demonstrated through the Green Aid Plan. There has been some adoption of flue gas desulfurization technology since 2000, but not the specific equipment showcased in GAP demonstration projects. Energy-efficient technologies are faring slightly better. Technologies demonstrated in China's steel sector—especially coke dry quenching (CDQ) and blast furnace top pressure recovery turbine (TRT)—are beginning to show signs of diffusion. Most notably, a Japanese-Chinese joint venture was established in 2003 and fulfilled five orders for CDQ equipment by the end of 2005.<sup>5</sup>

One reason for the lack of diffusion of GAP technologies is timing; Japan made an early push on energy-efficient technologies and CCT when conditions for diffusion were not so favorable (Ohshita and Ortolano, 2006). Another reason is the GAP's focus on industrial retrofits, which are more difficult to replicate than new facilities. In addition, technology choices in the GAP were not supported by detailed market analysis and market development policies. In comparison with some technology transfer efforts of the World Bank, the Asian Development Bank (ADB) and other bilateral lenders, relatively little economic analysis was conducted for the Green Aid Plan.<sup>6</sup> Without

---

3 Projects involving retrofits of efficiency-enhancing technologies at existing enterprises might attract other sorts of investment (from the private sector or from domestic government), but projects involving retrofits of pollution control technologies are generally not appealing to investors, as end-of-the-pipe pollution control usually does not generate profit. For example, the 1998 Japanese yen loan package to China provided funding for a large, new thermal power plant with a flue gas desulfurization (FGD) system in Shaanxi province. In contrast, the Green Aid Plan funded the retrofit of FGD equipment at an existing chemical plant in Shandong province.

4 From METI and NEDO brochures and internal documents, 2004.

5 Based on interviews with NSC in Tokyo and Beijing, 2004 and 2005. The joint venture was formed between Nippon Steel Corporation and Shougang Group and is named the Beijing JC Energy & Environment Engineering Co., Ltd. (BJCEEE). For more information about this and other NSC joint ventures in China, see <http://www.nsc.co.jp/>

6 Individual Japanese firms participating in the GAP did some internal economic analysis, but there was little done programmatically under the GAP.

assessment of enterprise preferences and trends in prices of energy and coal-related equipment in China, it is difficult to target specific industrial sectors and select the technologies that are most likely to diffuse. And while GAP cooperation is designed to carry out technology demonstration, it needs new mechanisms to promote wider technology diffusion.

Based on a decade of experience with the Green Aid Plan, METI has been considering how to engage in policy collaboration with East Asian countries to create more incentives and promote the diffusion of energy efficiency technologies. There has been ongoing discussion within the ministry about placing greater emphasis on “soft” cooperation (training and management programs, policy cooperation) and less emphasis on “hard” cooperation (equipment).<sup>7</sup> METI has also been exploring the use of the Green Aid Plan in conjunction with CDM under the Kyoto Protocol. While some East Asian countries are open to the idea, the GAP in China has halted over the CDM issue. Further dialogue is needed to develop cooperation mechanisms that address the interests and priorities of stakeholders in both countries.

### Technology cooperation with China: GEF-World Bank Industrial Boiler Project

The Industrial Boiler Project of the Global Environment Facility (GEF) was launched in 1996 and administered by the World Bank. The project took the rather unusual approach of funding the acquisition of licenses from foreign boiler manufacturers so that Chinese enterprises could produce more efficient boilers domestically. The logic behind this approach was that the transfer of manufacturing licenses would be more economically efficient than the transfer of equipment, since manufacturing costs would be lower in China. The project was also unusual in that the GEF typically does not fund coal-related projects; the boiler project qualified as a climate change mitigation project based on the CO<sub>2</sub> emission reductions it could achieve through improving boiler energy efficiency. The GEF pledged US\$33 million for the project, and an additional US\$68.3 million was to come from local bank loans, working capital loans and enterprise funds.<sup>8</sup>

The GEF project was based on fairly detailed economic, financial and market analysis, as well as technical and environmental analysis. The study team for the project considered trends in demand for specific types of boilers, coal prices, boiler prices, manufacturer capabilities, etc., and specified project benefits in terms of efficiency improvements, energy saved, emission reductions and the cost of CO<sub>2</sub> reductions. The project team consulted with stakeholders early and utilized an open and competitive process for the selection of

---

7 Based on interviews with METI and NEDO officials by S.B. Ohshita, 1999, 2004 and 2005, Tokyo.

8 Details on the GEF industrial boiler project in China can be found in World Bank, 1996. See also Nautilus Institute, 1999; and Birner and Martinot, 2005.

manufacturers to participate in the project. Despite all these efforts, it ran into implementation delays and serious problems with license acquisitions from foreign boiler manufacturers (Ohshita, 2003: 238-246).

The concerns of foreign boiler manufacturers over intellectual property and competitive advantage were a major stumbling block for the GEF boiler project. In general, China's rather weak record on patent protection, and difficulty in establishing trust between Chinese and foreign manufacturers, made foreign firms leery to participate. These general concerns, coupled with a demand by the former Chinese Ministry of Machinery Industries for blanket license agreements to cover all Chinese boiler manufacturers in all of China, caused many prominent foreign boiler manufacturers to distance themselves from the project. The project had to engage in several rounds of license bidding as foreign suppliers were unwilling to transfer technical know-how. The foreign firms that did participate were relatively small and less established (Evans, 1999; Watson *et al.*, 2000).

Interviews by U.K. and Chinese researchers identified another concern of foreign boiler manufacturers about the GEF project: excessive risks in making guarantees based on vague fuel specifications (Watson *et al.*, 2000). While boiler specifications for the project were quite detailed, the vague coal specifications (due to high variability in the quality of Chinese coal) made it difficult for foreign boiler manufacturers to provide the guarantees of their designs demanded by local project management office (PMO) staff. At least two firms pulled their proposals over this issue as well as concerns about intellectual property. Finally, turnover in PMO staff in China led to implementation delays, and other problems resulted from the PMO staff's limited project management experience (Birner and Martinot, 2005).

On the positive side, the industrial boiler project assisted a subset of Chinese industrial boiler manufacturers in acquiring foreign technology and improving the energy efficiency of their products (Birner and Martinot, 2005). The project provided mainly technical assistance and technology development and accelerated the improvement of industrial boilers in China; at the time of the project's initiation, Chinese boiler technology lagged behind international levels. Without the project, the process might otherwise have taken 10 years.<sup>9</sup> On the negative side, there were long delays in license procurement for the nine participating boiler manufacturers. An additional factor that may limit the impact of the project is the rapid changes in the boiler market after the project started. This was due to higher coal prices which increased demand for more efficient boilers. The demand side of the market was not addressed in the project.

---

9 Interview with China GEF office, Beijing June 27, 2005.

Both the GEF Industrial Boiler Project and Japan's Green Aid Plan point to the need for cooperation on policies and implementation to create incentives for the adoption of cleaner, more efficient technologies. Technology transfer efforts must be accompanied by the pursuit of conditions favorable to wider technology diffusion. The rest of this chapter examines how policy development cooperation works, highlights examples and summarizes key criteria for successful cooperation.

### **4.3 How Policy Development Cooperation Works**

Experience from technology cooperation, as well as broader lessons from development aid, point to the limitations of project-based cooperation and government-chosen technology transfer. Recent activity on collaborative development of policy incentives for investment in energy-efficient technologies shows that policy development cooperation can be highly effective in leveraging private funds and achieving large energy savings. Changing circumstances in East Asia are creating a fertile environment for this form of cooperation. Industrialization and economic modernization are causing severe pollution and resource constraints in the region. At the same time, countries in the region have acquired more advanced technologies and technical expertise. They have been developing the capabilities of their environmental and energy agencies and gaining experience in different forms of cooperation. There is a greater openness toward policy development cooperation done in a truly collaborative manner, and participants emphasize that there is need for even more of it.

Appliance energy efficiency standards in China are an illustration of successful policy development cooperation. China now produces more consumer appliances than any other country. Energy consumption by these appliances is growing at a rapid rate. Thus there is tremendous energy savings potential that can be realized through minimum energy performance standards (MEPS) and labeling criteria for appliances. By developing standards and labels for these products, China can ensure cleaner, more sustainable development of the consumer appliance market. These energy savings in turn can enhance economic efficiency, enhance consumer welfare and strengthen competitive markets, while mitigating local and regional pollution and climate change.

In the late 1980s, energy efficiency experts from the U.S. and China began a dialogue on appliance efficiency policy that flowered into many cooperation efforts. The dialogue was strengthened with the establishment of the China Energy Group at the Lawrence Berkeley National Laboratory (LBNL), which focused organizational attention on Chinese energy efficiency matters in the U.S.<sup>10</sup> LBNL then joined the Pacific Northwest National Laboratory (PNNL)

---

10 For more information about the China Energy Group at LBNL, see: <http://china.lbl.gov/china.html>

and their counterparts in China's Energy Research Institute (ERI) to form the Beijing Energy Efficiency Center (BECon) in the early 1990s.<sup>11</sup> BECon is a non-profit organization housed within ERI and approved by China's National Development and Reform Commission (NDRC, formerly SPC).<sup>12</sup>

With this institutional framework, LBNL and BECon gained initial support from USAID and the U.S. Environmental Protection Agency in the mid-1990s to work cooperatively on the design of more efficient Chinese refrigerators and on the establishment of refrigerator efficiency standards and labels. Encouraged by the success of the collaboration, other institutes in China became involved, as well as other U.S.-based organizations, including the Alliance to Save Energy and the International Institute for Energy Conservation (IIEC).

By 1999, the three U.S. organizations mentioned above—LBNL, the Alliance to Save Energy and IIEC—formed a partnership dedicated to appliance efficiency: the Collaborative Labeling and Appliance Standards Program, or CLASP (see Chapter 3 for more about CLASP). By 1999, other collaborative policy development activities were underway, including China Green Lights and Green Buildings, involving more organizations and funders. CLASP continued cooperating with CNIS to develop efficiency standards and labels for other appliances, including air conditioners and televisions. Also by 1999, the U.S.-based Energy Foundation established its China Sustainable Energy Program or CSEP (see Chapter 3 for more about CSEP) to support more policy development activities aimed at energy efficiency in China.

The year 1999 also saw the launch of the GEF-UNDP-China project on the commercialization of energy-efficient refrigerators. Using multiple cooperation mechanisms, the GEF project was incredibly successful in transforming the Chinese refrigerator market with more efficient products. The GEF refrigerator project emerged from the ongoing policy cooperation between U.S. and Chinese efficiency experts. LBNL staff crafted the proposal to the GEF, which resulted in a five-year effort (1999–2004) with roughly US\$40 million in total funding. On the Chinese side, the GEF-UNDP project involved China's State Environmental Protection Agency (SEPA); the China Household Electrical Appliances Association (CHEAA); the China Household Electronic Appliances Research Institute (CHEARI); and the Chinese National Institute for Standardization (CNIS). CNIS led the standard and label development, while CHEARI and CHEAA led survey and outreach activities. Activities

---

11 The Advanced International Studies Unit (AISU) of the Pacific Northwest National Laboratory (PNNL) also created energy efficiency centers in other countries with economies in transition, including Russia and Ukraine. For further information about the energy efficiency centers, see: <http://www.pnl.gov/aisu/centers.htm>

12 For further information about the Beijing Energy Efficiency Center (BECon), see: <http://www.beconchina.org/>

included study tours and technical workshops for manufacturers; media campaigns and product labels to reach consumers; and training for product retailers. The S&L portion of the project was conducted with Energy Foundation funding and the involvement of LBNL and CLASP. If the project is successful in creating energy savings of 20 per cent per year over 15 years, it will save 120 billion kWh, equivalent to saving nearly 72 million tons of coal and reducing carbon dioxide emissions by 143 million tons.<sup>13</sup>

Through cooperative policy development, China has now implemented 11 MEPS for nine products and endorsement labels for 11 products, including refrigerators, air conditioners, televisions, printers, computers, monitors, fax machines, copiers, DVD/VCD players, external power supplies, gas water heaters and television set-top boxes (under development). These measures are expected to save 85 TWh annually by their 10th year of implementation. By 2020, China's S&L program is estimated to save 11 per cent of residential energy use and reduce CO<sub>2</sub> emissions by 34 million tons annually. Through these energy savings, China can avoid nearly \$20 billion in investments for power plant construction, the equivalent of 50 large (500 MW) coal-fired power plants.<sup>14</sup> These are significant energy savings, but more are needed as use of residential and office appliances continues to increase.

The essence of the collaborative policy work with China by CLASP and others is knowledge transfer—sharing with China the last 20 years of experience and toolkits that have been developed around the world to support S&L programs. The success of S&L policy development in China has come from cooperation with an international network of energy experts from a wide range of organizations and groups. Training of Chinese counterparts has been crucial. LBNL and CLASP have provided 196 person-weeks of training for 90 officials from five agencies, split roughly evenly between training at LBNL and training inside China.

As China's capacity for S&L implementation has grown, the nature of CLASP's support has shifted from technical training and capacity building for the domestic program to assistance in extending market transformation effects internationally through harmonization of efficiency specifications. Most notably, in 2005, China, Australia and the U.S. adopted a harmonized set of efficiency specifications for external power supplies, based on a single testing standard. Current efforts support both the application of China's S&L programs into new market transformation programs domestically—such as government procurement—as well as the expansion of China's international outreach in additional harmonization efforts.

---

13 For more information on the GEF-UNDP-China refrigerator project, see <http://www.gefchina.org.cn/news/index.htm>; Birner and Martinot, 2005.

14 Analysis by David Fridley, LBNL, 2006; personal communication.



## 4.4 A Shift Toward Policy Development Cooperation

Recognizing the power of policies that promote energy efficiency, more organizations have been engaging in policy development cooperation. Many East Asian cooperation efforts on policy development have gained momentum since the beginning of the new millennium, with a few just launched in the past year or two. Governments involved in bilateral cooperation have realized the need for supplementing technology cooperation with the development of policies that support the diffusion of more efficient technologies. Multilateral organizations have given more emphasis to collaborative policy development, providing funds to bring energy efficiency experts and policy-makers together. Energy efficiency has been gaining greater attention at the regional level, especially with policy cooperation on appliance efficiency standards. Most active in policy development cooperation are independent international organizations composed of networks of experts committed to energy efficiency and conservation. Activities by different kinds of organizations are highlighted below, showing the trend toward more cooperation in the area of policy development.

### Bilateral policy development cooperation

Bilateral (government-to-government) cooperation tends to focus on technical assistance and technology cooperation more than policy development cooperation. For example, Japanese development assistance related to energy and environment—including ODA and other efforts such as the Green Aid Plan—has typically been directed toward technical assistance or technology development, not to bilateral policy development cooperation. This emphasis in the form of cooperation is due to the economic interests of Japan and neighboring countries; political sensitivities and history; and differences in the policy-making process. Japan is more engaged in policy dialogues at the multilateral level, such as appliance efficiency standards or automobile fuel economy standards.

Nevertheless, there are a few examples of Japan involved in bilateral policy development cooperation on energy efficiency. One example of bilateral policy development cooperation is a Japan-Thailand effort on the development and implementation of an energy manager system—a system that includes legal requirements for certified energy managers and energy audits, as well as a training institute and exam procedures for certification. This cooperation grew out of ongoing relationships among Japanese and Thai agencies that had worked together on other GAP and ODA projects. The decision to engage in policy cooperation was also based on Japan's experience with GAP and the limitations of project-based technology demonstration. The Japanese International Cooperation Agency (JICA) worked with METI and their Thai counterpart, the Department of Alternative Energy Development and Efficiency (DEDE), from 2002 to 2005 to establish a national training and

examination system for certified Energy Management Administrators.<sup>15</sup> Japanese funds were used to train Thai instructors who could, in turn, offer energy management training courses and administer the energy exam to Thai enterprise staff. Funds were also used to support the development of Thai policies that require energy-intensive enterprises to have an Energy Management Administrator on their staff and to carry out energy audits and conservation measures.<sup>16</sup>

### Multilateral policy development cooperation

On a multilateral level, GEF projects have utilized complementary cooperation mechanisms: technical assistance to promote technology development; and capacity building and public information campaigns to promote the development of markets for energy-efficient technologies. For example, multiple cooperation mechanisms were utilized in the GEF-World Bank projects in Thailand on demand-side management and building chillers (refer to Table 3.2). A number of multilateral activities have incorporated a policy development component as well. The GEF-UNDP-China effort to commercialize energy-efficient refrigerators is one example where the development of standards and labels was integrated with technology cooperation, market development and consumer outreach.

The GEF-UNDP-China End-Use Energy Efficiency Programme (EUEEP) is another example of policy development cooperation integrated with other forms of cooperation; EUEEP is discussed under multilateral cooperation in Chapter 3. The Efficient Lighting Initiative (ELI) is a prominent example where cooperative policy development was a primary focus of multilateral activity; ELI is discussed in Chapter 5 as a successful example of cooperation in the lighting appliance sector.

### Regional policy development cooperation

At the regional level, countries are engaged in policy dialogue on energy efficiency under the auspices of ASEAN, ASEAN+3 and APEC (refer to Table 3.3). Much policy cooperation at this level is in the form of information sharing (IS) and joint commitments to develop national policies that support regional goals. Collaborative policy development has been undertaken in a few notable instances, especially development of a regional energy efficiency label under ASEAN, and coordination of standards development and energy efficiency test procedures under APEC. These regional efforts are discussed in Chapter 3.

---

15 For more information on the Japan-Thailand project for energy managers and other energy efficiency cooperation efforts involving the Energy Conservation Center, Japan, see: <http://www.eccj.or.jp/overview/int-coop06.pdf> and [http://www.eccj.or.jp/index\\_e.html](http://www.eccj.or.jp/index_e.html)

16 Based on discussions with METI Technical Cooperation Division, July 2004.

## Independent organizations in policy development cooperation

Independent organizations have been particularly active in policy development cooperation, targeting several sectors, including industry, appliances, autos and buildings (refer to Table 3.4 for a list of activities).

Independent network-based organizations also play an important role in facilitating collaboration between individual countries, among multiple countries and within regional organizations. Activities involving bilateral, multilateral and regional organizations have all served to foster information sharing on energy efficiency policies. The ability of these governmental organizations to directly engage in joint development of national policies can be constrained, however, by other aspects of their relationships (political, economic, etc.). In contrast, independent (non-governmental) organizations have greater flexibility to engage in policy development cooperation. They are not required to represent the political stance of any particular country, nor does their involvement oblige any country to make any political concessions. Nor are they beholden to narrow corporate interests or obliged to promote particular technologies from particular corporations (provided their funding does not have strings attached). Rather, independent organizations are motivated by a committed network of experts who recognize the need for energy efficiency and conservation on a global scale—and the importance of policy tools to achieve results.

### **4.5 Conclusion: Policy Development Cooperation that Builds Capacity, Creates Incentives and Transforms Markets for Energy Efficiency**

Experience, thus far, on policy development cooperation suggests five key criteria for successfully promoting energy efficiency and conservation. Significant achievements in this form of cooperation:

- have a core group with a mission dedicated to energy efficiency and conservation;
- are composed of committed individuals with substantial expertise;
- are focused on policy development cooperation;
- are sustained by consistent and sufficient funding; and
- are enabled by high-level governmental support.

In cooperation between independent organizations and governments, the “core group” may be a program or office within a foundation (e.g., the Energy Foundation’s China Sustainable Energy Program), or a secretariat (e.g., the CLASP secretariat). On the side of the collaborating government, the core group may be an office within an agency or an entire institute (e.g., China National Institute for Standardization). Even if the government structure

shifts, a dedicated group of individuals can maintain the collaboration. Independent organizations have had to work hard to maintain funding for their efforts; with stable funding they are better able to sustain collaboration over longer periods of time—and achieve greater energy savings as a result. The collaborative development of policy and its actual implementation are only possible with high-level support from the government wanting to enhance energy efficiency in its country. The commitment by China's top leaders to promote energy efficiency and energy conservation—and their willingness to engage in policy collaboration—are the keys to China's successes.

In regional cooperation, the above criteria are exemplified by APEC cooperation on appliance efficiency policies. The Expert Group on Energy Efficiency and Conservation (EGEE&C), which is a core group formed by APEC's Energy Working Group (EWG), had a clear mission embodied in their name and a focus on policy development. Even though APEC is a large organization, the creation of EGEE&C directed organizational attention and resources to the efficiency group. Wiel and Lebot (2006) observe that a few individuals within the group were especially important in motivating activity, and those individuals were fortunate to work with a larger group of experts from the APEC member countries. The group's activities were sustained by ample funds from APEC on an ongoing annual basis. The group is also sustained by high-level support from APEC Energy Ministers who gave the group its initial mandate and have stayed committed to enhancing energy efficiency and conservation in the region.

In light of these criteria for success, there are several implications for further policy development cooperation in the East Asian region. To share its considerable experience in energy efficiency, Japan would do well to address some institutional challenges in its cooperative activities. One challenge is the personnel rotation system in Japanese government agencies and in many large private companies; the frequent rotation of staff can make it difficult to keep dedicated experts working on energy efficiency cooperation. The system does have the benefit of rotating expertise in, especially when industry staff are on loan to government agencies, facilitating information exchange and understanding of actual market conditions. The rotation system can also bring in new perspectives from government officials working in other policy arenas. For example, an official who has been working on East Asian trade issues may have new ideas for cooperation on energy efficiency improvement vis-à-vis trade. However, the rotation system can bring cooperation efforts to a standstill if an official assigned to lead cooperation efforts has an adverse stance toward partners. Based on the successful experience of policy development cooperation with independent and regional organizations, as well as Japan's past experience in other forms of cooperation, the implication for Japan is that the commitment of funds and dedicated experts to a separate organization could yield successful cooperation results. This approach would work well for the involvement of other governments and businesses as well.

In conclusion, examination of existing cooperation on energy efficiency in East Asia shows a movement from government-sponsored technology transfer toward policy development cooperation. Policy development cooperation yields widespread results and large energy savings because it emphasizes policies and programs rather than isolated projects. This form of cooperation can make limited funds from governments or NGOs go a long way by leveraging private investment and promoting change among energy end users. Policy development cooperation also fosters continued work on energy efficiency by strengthening institutions in developing countries. Cooperation experience shows that integrating forms of cooperation, e.g., policy development combined with capacity building and technical cooperation, yields the strongest results.

# 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.<sup>1</sup>

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.

---

<sup>1</sup> 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.**

<b>Industry (Steel, Chemicals, Cement, Boilers)</b>
<ul style="list-style-type: none"> <li>• Japan-China-SE Asia: Green Aid Plan technology demonstration in steel, chemicals and cement; energy manager training</li> <li>• U.S.-China: industrial motor efficiency standards</li> <li>• U.K.-China: energy conservation plans for Top 1,000 Energy-Using Enterprises</li> <li>• GEF-World Bank-China: manufacturing license transfer for efficient industrial boilers</li> <li>• Energy Foundation (CSEP)-China: steel sector voluntary agreements</li> <li>• GEF-UNDP-China End-Use Energy Efficiency Program (EUEEP)</li> <li>• EU-China Energy &amp; Environment Program (EEP)</li> </ul>
<b>Appliances</b>
<ul style="list-style-type: none"> <li>• CLASP-China: standards &amp; labels (S&amp;L) for air conditioners, washing machines, TVs, computers, etc.</li> <li>• CLASP-ASEAN: S&amp;L coordination</li> <li>• CLASP-APEC: S&amp;L coordination</li> <li>• Energy Foundation CSEP-China: S&amp;L policy development</li> <li>• GEF-UNDP-China: commercialization of efficient refrigerators</li> </ul>
<b>Electric Power</b>
<ul style="list-style-type: none"> <li>• Japan Green Aid Plan: efficient generation technology transfer, sulfur dioxide control</li> <li>• EC-ASEAN Co-generation</li> </ul>
<b>Demand-side Management (ESCOs/EMCs)</b>
<ul style="list-style-type: none"> <li>• GEF-World Bank-China: launch of Energy Management Companies (EMCs)</li> <li>• GEF-WB-Thailand: DSM Program</li> <li>• ADB-Asia: creation of an Energy Service Company (ESCO) Fund, starting in India, Malaysia, the Philippines, and Thailand</li> <li>• ADB-China: “Efficiency Power Plant” (promoting DSM rather than new supply)</li> </ul>

**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**

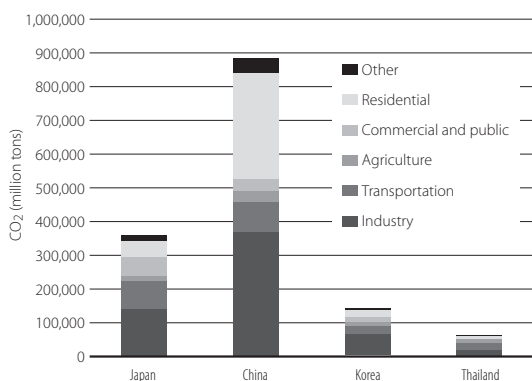
- Energy Foundation-China: policy development of fiscal incentives for energy conservation
- REEEP-China: creation of innovative energy fund and financing mechanisms

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).<sup>2</sup> 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).

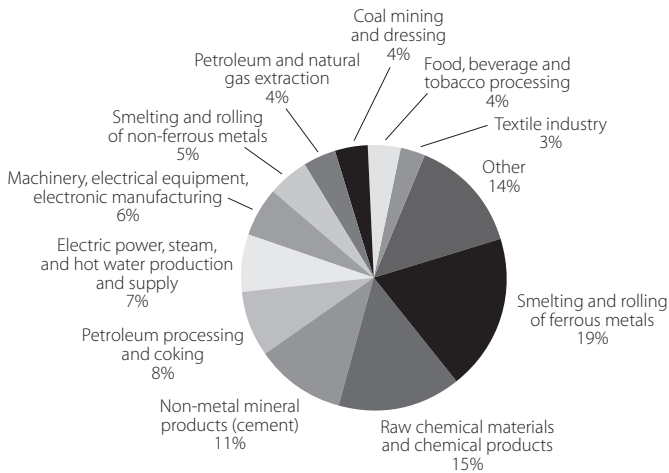


Source: Based on data from IEA Energy Statistics, <http://www.iea.org>

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.<sup>3</sup>

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**

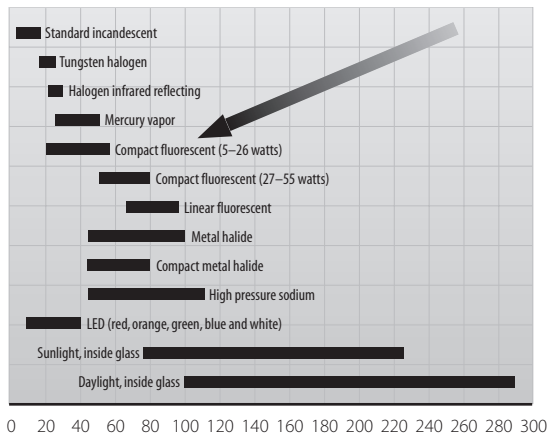
Of the many appliances with growing energy consumption in developing countries, lighting is a major end-use of electricity. In China, the efficiency of lighting equipment is often low, making this fundamental energy service a large economic burden on consumers. Thus, improving the efficiency of lighting 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 than 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.<sup>4</sup> 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.<sup>5</sup>

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.<sup>6</sup>

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).<sup>7</sup> 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:<sup>8</sup>

- 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.<sup>9</sup>

## **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](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
<p><b>Policies, Targets and Reporting</b></p> <ul style="list-style-type: none"> <li>• Energy savings goals; tracking and reporting progress</li> <li>• Government organization (e.g., lead responsibility for energy savings, inter-agency committees)</li> <li>• Budget policies (e.g., life-cycle costing, separating budget lines for energy, energy cost savings sharing among agencies)</li> </ul>	Argentina Brazil Ecuador Mexico <b>Philippines</b> Russia
<p><b>Existing and New Public Buildings</b></p> <ul style="list-style-type: none"> <li>• Energy audits</li> <li>• Retrofit projects: lighting, HVAC, building envelope, controls</li> <li>• Financing: third-party (ESCO) funding, loan funds, leasing</li> <li>• Efficiency standards and guidelines for new buildings</li> <li>• Design assistance, software tools, architect training</li> <li>• Technology demonstrations or showcase facilities</li> <li>• Building system commissioning: pre-occupancy and ongoing</li> <li>• Energy metering/monitoring, benchmarking, operations feedback</li> </ul>	Australia Brazil Mexico New Zealand Russia <b>Thailand</b> U.S.
<p><b>Energy-efficient Procurement</b></p> <ul style="list-style-type: none"> <li>• Specify and purchase efficient building equipment, office equipment, motors, lighting and appliances</li> <li>• Efficient and alternative fuel vehicles for government fleets</li> <li>• Green power purchasing</li> </ul>	<b>Korea</b> <b>Japan</b> U.S. <b>China</b> (in development) Mexico (in development)
<p><b>Public Services: Transport, Water and Utilities</b></p> <ul style="list-style-type: none"> <li>• Water supply and treatment systems</li> <li>• Street lighting, LED traffic signals</li> <li>• Public transport (transit operations, bus driver training, etc.)</li> <li>• O&amp;M for fleet vehicles; promoting ride-sharing and transit</li> </ul>	Argentina Brazil Colombia India Mexico
<p><b>Training, Information and Recognition</b></p> <ul style="list-style-type: none"> <li>• Facility manager training and certification</li> <li>• Operator incentives and recognition (awards)</li> <li>• Employee information and outreach campaigns</li> </ul>	Australia Mexico New Zealand <b>Philippines</b> U.S.

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.<sup>10</sup> 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:<sup>11</sup>

- 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.

**Part III**  
**Proposal for a New Energy Efficiency**  
**Policy Development Fund**



In Parts I and II, we observed the following:

1. All countries in East Asia have some energy efficiency policies in place already and many have made great progress. But there still exists a large potential and an acute need for further energy efficiency improvement. Energy efficiency policies require ongoing adjustment and revitalization as technology advances. International cooperation can promote energy efficiency improvement and realize multiple benefits, including energy security, economic stability and environmental quality.
2. In terms of cooperation mechanisms, *policy development cooperation*, beyond policy dialogue, is growing in importance as host countries create a top-down push and incentives for energy efficiency improvement to leverage private and governmental financing.
3. In terms of the institutional structure of such cooperation, we observe the growing role of independent, *international networks* that facilitate the development of energy efficiency policies.
4. There is a trend in target sectors and technologies toward *more distributed targets* such as appliances, buildings and demand-side management. In the industrial sector, there is a trend away from hard technology demonstration to soft and more comprehensive policy tools, including voluntary agreements and energy management systems.
5. Despite existing cooperation efforts, there are still massive opportunities for government intervention in energy efficiency improvement to accelerate the uptake of new, more efficient technologies. In contrast with the high-level political attention paid to energy efficiency improvement, energy efficiency agencies are chronically understaffed and underfinanced, and lack the capacity to develop and implement necessary policy.
6. While existing international organizations are financing several policy development activities, the resources have not been sufficient to support many other worthwhile activities. In addition, host countries have frequently found the need for quicker responses than multilateral institutions can typically provide.



In sum, most governments understand that energy efficiency improvements have multiple benefits, ranging from energy security to economic efficiency; pollution reduction and climate change prevention. However, political attention and resource allocation have rarely been enough to consistently implement energy efficiency policies on the ground. Many countries lack dedicated institutions with the scientific expertise and industrial participation that are necessary to regularly update regulations and monitor compliance. In many countries, there is only a handful of staff in charge of all energy efficiency policies for an entire country. There is a need to strengthen the energy efficiency institutions and to enhance their work through international cooperation.

Other modes of technology cooperation are important, but their roles are secondary to the policy assistance described above. There have been many cases of technology demonstration projects that have not resulted in the diffusion of the targeted technologies, due to insufficient market analysis or limited implementation of environmental regulations (Ohshita, 2002). Personnel training and exchange programs have generally met their own internal goals, but their effectiveness is generally difficult to measure in quantitative terms such as energy or CO<sub>2</sub> reductions. For an international framework to be widely supported, it is important that actions (e.g., persons trained and standards set) as well as outcomes (energy reductions and CO<sub>2</sub> reductions) be measurable. Assisting the implementation of policies and measures, particularly energy efficiency standards, has been successful in this regard.

# Chapter 6

## The Fund Proposal

By Taishi Sugiyama, Steve Wiel, Alan Meier and Jonathan Sinton

The findings in the last two pages lead us to propose establishing the Policy Development Fund for East Asian Energy Efficiency Cooperation (henceforth, the “Policy Development Fund” or the “Fund”), which is a new, dedicated fund for energy efficiency policy development cooperation in East Asia. This chapter discusses the key design issues of the Fund, presents the Fund proposal in a legal format and assesses its political feasibility and effectiveness.

### 6.1 Key Design Issues

#### A. Requirements of the Fund

There are many requirements that the Fund proposal, or any institutional design proposal in general, has to meet in order to attract enough political attention and support so that the institution will be politically stable over the long run. In addition to the lessons summarized in the previous pages, the following will have to be taken into consideration:

a) **Careful consideration of national priorities and sensitivity to participating countries**

National priorities differ across countries. Most countries attach a high priority to economic efficiency and energy security, and are keen on international cooperation. However, some countries’ attitudes are not welcoming—sometimes even adversarial—when the issue is framed as emissions control in the context of climate change. Furthermore, we have to note that national circumstances are rapidly changing in this fast-growing region. A policy that was successful 10 years ago may be outdated today.

b) **Aim for massive energy savings and significant emissions reductions**

Working on a single project at a specific site does not necessarily result in a significant impact on the energy efficiency of a country as a whole. We have to aim at massive energy savings, with limited financial resources. For this purpose, well-focused assistance that creates appropriate incentives for the private sector will be crucial.

c) **Commitment to policy mechanisms for concrete actions**

While there is consensus at a general conceptual level that cooperation on energy efficiency is a good idea, we must be aware that such discussions often take place without a clear idea of concrete actions. The details matter for any cooperation activity. Without careful design of concrete actions, conceptual conversations do not achieve the desired results.

#### d) Build upon existing activities

Launching new actions out of thin air is extremely difficult. It takes time to understand the problem, to network with local and international partners, to learn from successes and errors, and to identify a promising cooperative solution. Therefore, it is important to take advantage of existing activities when we design further concrete actions.

Having given a general overview, we will go into more detail. Here we discuss key institutional design issues about the Policy Development Fund at three levels: the political agreement; modality; and coverage of the projects.

### B. Political agreement

There are many ways of reaching political agreement for the Fund. We will consider the following questions: which countries join?; how many members will there be?; and what will the scope of the Fund be?

Let us first consider the number of countries. There are some issues to be considered. If it is bilateral, a political agreement might be damaged by political changes within participating countries. For example, imagine a China-Japan bilateral energy efficiency framework. A political upheaval, which has nothing to do with energy efficiency, might be an barrier to continued development of the energy efficiency cooperation.

If the Fund is joined by many countries, a bilateral upheaval does not undermine the regime and there will be less danger that the program may be captured by narrow interests. However, there are costs, too. The effectiveness of the process will be very hard to maintain if everything is discussed by all countries. For example, the CDM under the Kyoto Protocol is struggling with the challenge of coordinating more than 180 countries.

A notable benefit of keeping the number of countries small is to make it easy to identify the areas of agreement, promote stability and align interests. This is particularly important for East Asia, since its countries are diverse, and the level of political and economic integration is not high compared to the countries within, for example, Europe or North America. Yet, interestingly enough, energy efficiency is the area where these countries can truly cooperate. They have common characteristics. Access to energy is fragile, so they are interested in energy security. They are growing economies, with strong governmental interest in improving efficiency in all economic arenas. They are trading energy equipment within the region and exporting to the rest of the world. Having a common agenda with strong economic interaction within the region is an important background for mobilizing financial and human resources, and sustaining the political interest of participating countries.

With these considerations, *the authors believe that the countries should start with a multilateral agreement from the outset to avoid the potential weaknesses*

*of bilateral arrangements, but keep the number of initial participants small (perhaps as many as six) and then grow gradually.* In the long run, the agreement might expand to include more countries. For example, it can start with Japan, Korea, China and a couple of ASEAN countries, and expand to include most of the ASEAN countries and some donors from developed countries. However, it would not be wise to envision developing countries from all over the world joining the Fund, as this would dilute the attention given to any particular country while introducing many more differences in circumstances and points of view, as well as augmenting administrative costs considerably.

*As for issue area coverage, it should be confined to energy efficiency alone so that participating countries have a true area of common focus.* Putting energy efficiency cooperation in the context of general energy policy may sound attractive to some policy-makers, but we have to recognize that some energy issues are very divisive. Renewable energy, energy security and climate change are issues that might turn some countries away. Renewable energy is a common goal, but not the priority for energy policy in many countries. Energy security is divisive when countries begin discussing the ownership of natural gas fields and territories in the East China Sea or access to Russian oil and gas resources. Climate change is divisive when countries begin talking about a binding cap for national emissions. When combined with these issues, energy efficiency would be seen as a low priority, crippled by the adversarial negotiating climate of the other policy spheres. ASEAN+3 regimes have failed to address energy efficiency so far because oil reserves and other issues were seen as higher priorities. The CDM has a problem with its stability because the binding cap regime of the Kyoto Protocol is divisive, and there is doubt as to whether it can be sustained after 2012.

### **C. Modality of the Fund**

There are three questions to be answered regarding the modality of the Fund. Should it be a new fund or a branch of an existing organization? What does it fund? How does it operate?

#### **i) New fund or branch of existing organization?**

The Fund can be either a new one independent of the existing organizations (ADB, ASEAN or any other bilateral or multilateral agency), or another branch of such a new independent organization. The benefit of the latter is that the Fund could take advantage of a well-established institutional infrastructure.

The downside of having the Fund be a branch of an existing funding organization is the risk of being caught up in the bureaucracies of others. Some stakeholders interviewed expressed concern about the amounts of paperwork and lead-time required by some existing organizations. The burden of paperwork is serious since the office in charge of energy efficiency is often understaffed. Lead-time—months to years for an idea to be implemented—is also critical because the terms of governmental positions are often as short as two

years, and because capturing political timing, such as political debates due to an energy price spike, is also important for implementing energy efficiency policy. A new and independent office could set up its own systems and infrastructure and could conceivably be as nimble and responsive to recipients as it wanted to be.

While international banks and organizations are aware of such requests and are struggling for improvement, there is a limit to how much change is feasible. These organizations were established for other purposes. For example, part of the mandate of a multilateral development bank is to advance sustainable development through full accountability and transparency. Given this mandate, all their activities should naturally go through the required paperwork to show how it contributes to sustainable development.

However, perhaps such processes are unnecessary for the implementation of most energy efficiency improvement, especially with the limited amount of money in question. If a bank supports energy efficiency, it is obvious that it contributes to sustainable development. If the target is policy development, the money at stake is not as high as the multilateral development bank's contribution to an infrastructure-development project. Of course, the funding has to be cost-effective; the project should not result in adverse impacts to ecosystems and people; and the Fund should be accountable to donors. Still, given the much narrower and simpler scope for a Policy Development Fund, it can have a much simpler, more cost-effective governance system.

Given the above, *the authors believe there is a need for a new and dedicated fund, independent of existing multilateral organizations*, that will be used by policymakers in developing countries who specifically want to develop quick energy efficiency policies. Having a new and dedicated fund will also send a strong signal of political recognition for energy efficiency and will consider the dynamic needs of developing countries in the region as they change rapidly.

## ii) What does it fund?

The targets are co-financing of established activities as well as finding and funding new projects. Of course, finding new projects is necessary to cover a broader range of activities. However, starting everything from scratch is time-consuming and counter-productive. Existing activities on policy development assistance have worked well, as described in previous chapters and as will be described in section 6.2. Many projects have been identified and funded, people have gained experience, and have established networks among key people. Unfortunately, these activities were mostly the result of personal efforts and non-profit work, and lacked stable and strong national support from countries. If the Fund refuels these activities hand-in-hand with other financial organizations, the cost effectiveness will be high.

iii) How does it operate?

*The characterization of the Fund discussed above requires a quick decision-making process with little bureaucracy.* At the same time, there should be accountability to the donors and the operation of the Fund should be insulated from short-term political changes. Given these considerations, the authors propose an independent, professional management structure in which a sole CEO is selected by the Executive Board (consisting of donors and recipient countries) for a term of five years

Cost-effectiveness, in terms of the amount of foreign assistance versus energy savings in recipient countries, should be the key criterion in the selection of projects. However, we should allow the Fund to undertake strategic, long-term projects, such as establishing information platforms as well as short-term ones in order to nurture opportunities for long-term, massive energy cuts.

**D. Project coverage by the Fund**

The Fund’s potential target technologies and sectors are numerous given the broad definition of the Fund—policy development for energy efficiency. Given that almost all sectors in developing countries need further policy development—including information gathering; law stipulation; standard setting; monitoring; enforcement; and revision—there is a lengthy list of potential areas of cooperation. Table 6.1 illustrates the scope of activities, technologies and sectors to be addressed. To cover this range, the Fund has to have a professional operational system well-linked with a cross-border expert network that appropriately identifies key areas and captures ripe opportunities within individual developing countries.

**Table 6.1. Indicative list of target sectors under the Policy Development Fund.**

<b>Buildings Sector</b>
Efficient technology: e.g., CFL Initiative (lighting equipment)
Standby losses: e.g., set-top boxes, TVs, external power supplies
Building energy codes
Applications of cross-cutting approaches, e.g.: <ul style="list-style-type: none"> <li>–Appliance and equipment standards and labeling, e.g., CLASP</li> <li>–Tax and other incentives</li> </ul>
<b>Industrial Sector</b>
<i>Voluntary agreements with industry</i>
Energy management systems for system and process design assistance
Applications of cross-cutting approaches, e.g.,: <ul style="list-style-type: none"> <li>–Industrial equipment standards</li> <li>–Tax and other incentives</li> </ul>
<b>Transportation Sector</b>
Applications of cross-cutting approaches, e.g.: <ul style="list-style-type: none"> <li>–Efficiency labels for tires</li> <li>–Vehicle fuel economy standards and labels</li> <li>–Tax and other incentives</li> </ul>

---

### Cross-cutting

Public-sector efficiency programs, including procurement, e.g., PePS

Utility-based programs: demand-side management (DSM)

Energy service companies (ESCOs)

Incentives

- Credits for R&D, manufacturing, purchasing
- Equipment (catalog) and systems (design)
- Tax reductions, accelerated depreciation, incentive payments, rebates

Heat island mitigation

Note: The details are given in section 6.2 (B) for projects in *italics*.

## 6.2 The Policy Development Fund

Following the consideration of the key design issues above, we summarize our proposal in legal format to clarify the points, and then follow up with an assessment of the Fund's political feasibility and effectiveness.

### A. The Fund Proposal

The concept of the Fund is summarized as follows.

1. *The Fund*. Like-minded countries in East Asia agree to establish “The Policy Development Fund for East Asian Energy Efficiency” (hereafter referred to as “the Fund”).
2. *Aim of the Fund*. The Fund aims to promote energy efficiency through financial assistance for implementing policy and measures in the member countries.
3. *Contribution to the Fund*. Governments and private organizations voluntarily contribute to the Fund.
4. *Relationships with relevant preceding activities*. The Fund implements its programs either independently or through existing international networks and other organizations, whichever are deemed appropriate.
5. *Target region*. The Fund will start with a membership of three to six countries, with a goal of including most of the following: Japan, Korea, China and the ASEAN region.
6. *Measure of the Fund activity*. Activities of the Fund shall be measured in terms of both actions and outcomes. For example, the following indicators are used for the appliance/automobile energy efficiency policy: on the action side, stipulation/revision of standards and labels; on the outcome side, the estimated energy and emissions cut.
7. *Institutional structure*. An Executive Board and a Secretariat are established for the Fund. The Secretariat is led by a CEO designated by the Executive Board.

8. *Modality of the Executive Board.* One seat for each member country. Voting rules are weighted by contributions to the Fund. A Chair is selected by the Executive Board.
9. *Modality of the work of CEO.* The Fund is managed by the CEO. The CEO is accountable to the Executive Board. The CEO is not necessarily from any of the member countries. The CEO is responsible for allocating funds to programs proposed by the member countries or other organizations. The CEO is required to consider the following criteria upon selecting the programs: cost-effectiveness; measurability of the actions; and outcomes. The CEO has a term of five years.
10. *Modality of the work of the Secretariat.* The Secretariat is hired by, and works for, the CEO.
11. *Relationships with the Sovereignty.* The Fund does not impose specific policies in the member countries. It is a member country's prerogative to decide the style and stringency of their own laws, standards and any other governmental actions.
12. *Scope of the Fund's activities:*
  - a) General:
    - The Fund is available for the development and initial implementation of policy, not for the continuing costs incurred by the policy itself.
    - The Fund focuses on measurable and cost-effective activities.
  - b) Examples of policies, equipment/facilities:
    - Development/monitoring of efficiency standards and labels for appliances (e.g., light bulbs, air conditioners, copy machines, etc.) and automobiles.
    - Development of voluntary actions in industrial sectors/facilities.
    - Development/ monitoring of tax incentives and subsidy policies.
    - Others.

(for a more detailed list, see Table 6.1).
13. *Relationship with the UNFCCC/Kyoto Protocol.* The Fund is independent of the UNFCCC/Kyoto Protocol but aims to be part of global action to mitigate climate change.
14. *Revision of the modality.* The Executive Board may revise the modality (1 through 13) of the Fund.



We add some remarks to clarify the modality of the Fund. Financial contributions by donors are voluntary. Regarding the order of magnitude of the Fund, we think it is politically feasible in donor countries to secure US\$10–30 million annually at its initial stage, a modest amount compared to other international commercial and official financial activities.<sup>1</sup> It may expand further once the Fund proves to be operational and useful.

Financial support by the Fund is dedicated to formulation and initial implementation of energy efficiency policies in member countries. Recipients commit to implementation by themselves. Recipients, not donors, retain discretion over types and stringency of policy measures. It is important to maintain the voluntary nature of the Fund, otherwise it will be difficult to secure commitments by countries at the outset.

The CEO makes key operational decisions, including project selection, under the guidance of the Executive Board. While cost-effectiveness serves as the major criterion for the selection, a limited share is allocated to long-term strategic projects. The Fund supports new projects as well as existing efforts through co-financing.

It is important to measure the activities of the Fund by *actions* (e.g., laws stipulated, compliance monitored in the market, institutions established, etc.) as well as *outcomes* (e.g., energy savings and emission reductions). If the focus is solely on actions, there is a danger that the activities will be ill-designed, conducted irresponsibly and may have only a minimal impact. If the focus is too much on the outcomes, there is a danger that the scope of the projects will be limited to a narrow scope and the cost-effectiveness will be lost through high transaction costs. In the CDM, it is mandatory to rigorously calculate the emissions cut, because the certified emissions reductions (CERs) are to be traded with other emission units under the Kyoto Mechanisms, which translates into fewer emission cuts required for the developed countries domestically. The requirement for rigor is one of the reasons why the scope of CDM has been limited so far to methane, HFC and other non-energy greenhouse gas projects for which it is easier to agree upon quantification, and only a small part of the energy efficiency potential is likely to be explored through the CDM. Methodologically, it is very difficult to have an “accurate” estimate for the outcome of any project. The error range for an estimated emissions cut by a project can be as large as 50 per cent or more because there are data limitations, and the estimates are against a counterfactual baseline (emissions that would occur otherwise) that is largely subjective. For policy development assistance, the amount of emissions at stake as well as the likely range of error tend to be even larger than a project in a specific site with a specific technology. Putting too much emphasis on the rigor of the estimate could result in missing the most promising mode of energy efficiency improvement assistance.

---

1 See footnote 7 for examples of relevant budget size.

## B. Example projects

In order to illustrate how projects might operate under the Fund, four examples are provided below: (i) appliance S&L (e.g., CLASP); (ii) automobile fuel economy; (iii) efficient (low-resistance) tires; and (iv) voluntary efficiency agreements in industry. Each example includes: (a) background; (b) an explanation of what the Fund would pay for; and (c) a description of the potential energy savings and carbon reductions where data are available.

While these examples would help the readers have a better understanding about the policy development assistance, these four are by no means exhaustive. They are chosen (1) on the basis of the availability of data to the authors; and (2) to cover the building (residential and commercial) sector and the transport sector—for which energy consumption is rising most rapidly—as well as industry, which still consumes a large share of energy.

### i) Appliance Standards & Labeling (CLASP)

#### *a) Background*

Most East Asian countries, including China and Japan, have ongoing S&L programs as we have reviewed in Chapter 2. Japan's Top Runner program is recognized throughout the world for its innovation and effectiveness. China's program includes MEPS, comparison labels and endorsement labels. As mentioned in Part II, S&L programs require continuous refinement of product testing protocols; ratcheting of standards to more stringent levels; application of standards and labels to more energy-consuming products; strengthening enforcement procedures; and otherwise fine-tuning the S&L program to achieve greater and more cost-effective energy savings and GHG reductions.

#### *b) What the Fund would pay for*

Here is one example of how the Fund might support China's S&L program. The Fund might engage CLASP to conduct an assessment of the best practices in the enforcement of MEPS among the 49 countries that have adopted them. It might hold a workshop to explore the applicability of alternative enforcement mechanisms to China. And it might provide funding to the appropriate Chinese agencies to refine China's enforcement procedures, with or without additional outside assistance. Such opportunities exist throughout all the six essential steps of standard-setting and labeling:

1. developing a testing capability;
2. designing and implementing a label program;
3. analyzing and setting standards;
4. designing and implementing a communications program;
5. ensuring program integrity; and
6. evaluating the S&L program.

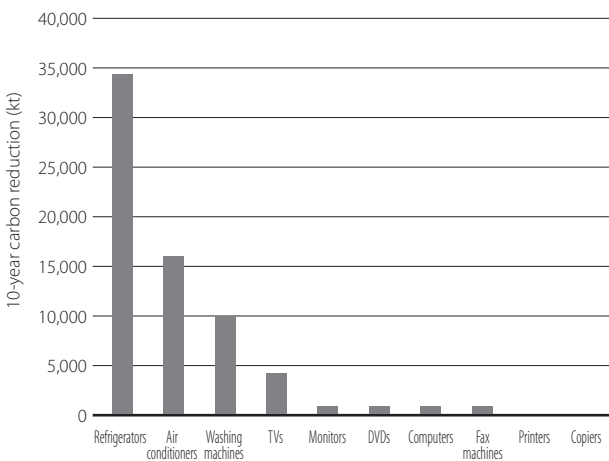
Throughout China’s design and implementation of its S&L program, CLASP has provided technical assistance in a variety of its aspects, ranging from providing the methodology for setting standards levels and labeling criteria, to drafting proposals for GEF co-funding. CLASP remains available to continue with such assistance.

*c) Energy implications*

As mentioned earlier, S&L is one of the most effective policies a government can adopt as a means of fostering economic development and reducing carbon dioxide emissions. For each taxpayer dollar it spends on S&L, the U.S. government has generated \$400 in net economic benefit to the economy and reduced four tons of carbon dioxide emissions over product lifetimes at a government cost of \$0.06 per ton. By the year 2020, experts calculate that energy efficiency standards and labeling will have helped avoid 20 per cent of planned new power generation, with the cost of saving each kilowatt being one-third of what it would have cost to generate it (Meyers, 2002).

Similar potential exists for most countries, as preliminary evaluations show for Thailand, Korea, Mexico and China. An unpublished study of China’s energy efficiency standards conducted for the U.S. Energy Foundation estimated savings from eight new minimum energy performance standards and nine energy efficiency endorsement labels that were implemented from 1999 through 2004 for appliances, office equipment, and consumer electronics. The study concluded that during the first 10 years of implementation, these measures will save 85 terawatt hours (TWh) of electricity and 82 megatonnes of CO<sub>2</sub> annually, as shown in Figure 6.1. By 2020, China’s S&L program is estimated to

**Figure 6.1. Reported carbon savings from standards and labeling in China.**



save 11 per cent of its residential energy use and avoid the need for US\$20 billion investment in power plant construction (the equivalent of 50 units of 500MW coal-fired power plants). The potential savings from China improving and expanding its S&L program over the next few years is half again the amount already saved.

Another unpublished report estimated that the cost, in terms of the amount of foreign assistance versus CO<sub>2</sub> emission reductions, was about US\$0.20 per ton of CO<sub>2</sub>. This is much less than some organizations are currently investing for CDM credits.

## ii) Automobile Fuel Economy Standards in China

### *a) Background*

Transport energy accounts for a third of total energy consumption in most developed countries. Although per capita consumption is still low in many developing countries, it is rapidly increasing.

An important characteristic of the transport sector is that it is highly dependent on oil. Before the oil supply shock of 1973 many countries used oil in almost all sectors including transport, industry, household and power generation. Since 1973, governments have taken action to replace oil with coal, natural gas, nuclear and renewable energy. As a consequence, most sectors are not highly dependent on imported oil now, except for the transport sector. Despite intensive governmental efforts to develop alternative fuel for automobiles, including coal liquefaction, synthetic oil production from natural gas and biomass ethanol production, the automobile sector is still dependent mostly on oil.

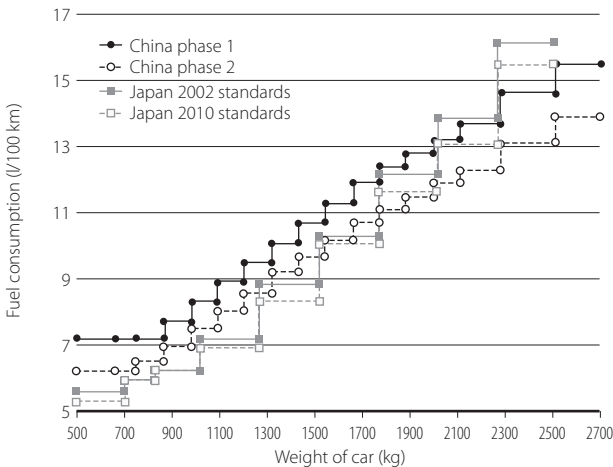
Access to oil was one of the major sources of international conflict throughout the twentieth century and is still regarded as a strategic national interest today. Combined with scarce resource availability in East Asia, energy supply security is of utmost priority for countries in the region. In particular, Chinese dependence on imported oil is growing and expected to increase in coming years. The percentage of crude oil imported has been rising from 31 per cent in 2002, and is estimated to grow to over 50 per cent by 2007. Over the next 10–15 years, Chinese oil consumption is expected to increase four per cent per year, positioning China as the world's second largest oil consumer behind the United States. By 2020, China is expected to become the world's largest oil consumer, with total projected oil consumption of 27.6 million barrels a day (Energy Information Administration, 2004).

China's Energy Conservation Act entered into force in 1998. As a part of implementation activities, China Automotive Technology and Research Center (CATRC), under the leadership of the former State Economic & Trade Commission (SETC), convened research on Chinese Automotive Fuel Economy Standards. The subsequent report made proposals for fuel economy

standards in China. As a result, China announced new fuel economy standards for its passenger vehicle and fleet in December 2003. These standards are weight-based and were to be implemented in two phases. The first was in 2005–2006 and the second in 2008, with separate standards for manual and automatic transmissions. Each vehicle sold in China will be required to meet the standard for its weight class. Overall, Chinese fuel economy standards are slightly more stringent than current fuel economy regulations in the U.S. Compared to Japan, China's standards are less stringent for light vehicles, but are much stricter for heavy vehicles including sports utility vehicles (SUVs). China's standards for heavy vehicles may be the most stringent in the world (Figure 6.2) (China Automotive Technology and Research Center, 2003; Sauer and Wellington, 2004).

Complying with these standards will be a challenge for manufacturers. According to analysis by the World Resources Institute, some international manufacturers will have to completely change the product mix to meet the standards. As such, the Chinese standards will have enormous impact on the transformation of the Chinese automobile market. Of course, it is yet to be seen if manufacturers will comply with the standards. It is unknown to what degree the standards will be monitored and enforced by Chinese authorities, particularly for Phase II standards. This leaves uncertainty about the degree to which the standards may affect the financial performance of automakers in China (Sauer and Wellington, 2004).

**Figure 6.2. Comparison of Chinese and Japanese automobile fuel economy standards.**



Note that the lines of Chinese standards cross those of the Japanese ones in the middle of the figure. This means that the Chinese standards are less stringent than Japanese ones for light vehicles, but stricter for heavy vehicles.

Source: China Automotive Technology & Research Center 2003

It is important to note that the standards were developed with international cooperation. The U.S.-based Energy Foundation provided part of the funding for the technical work necessary to develop the regulations. Several auto companies including Toyota, Honda, General Motors and Volkswagen, among others, provided expertise regarding the technical feasibility of the standards (China Automotive Technology and Research Center, 2003). This case clearly illustrates that (1) there are strong incentives for energy conservation in key developing countries; (2) international cooperation is important for the development and initial implementation of policies in developing countries; and (3) there is no need to mention politically-divisive issues, such as ownership disputes for gas fields or climate change, in order to make progress on energy efficiency improvement.

*b) What the Fund Would Pay For*

The development of the standards described above sets a very important precedent. If a country is interested in developing energy efficiency policies, an international fund can support technical work. That the standards have been set at ambitious levels—in particular for heavy vehicles—is a remarkable success. Future agenda items for the Fund will include the following:

- estimate environmental and energy benefits of the fuel economy standards;
- develop policies for implementation, monitoring and enforcement of the fuel economy standards;
- develop policies for introducing hybrid and alternative fuel vehicles into the market;
- develop policies for fuel economy standards beyond 2008; and
- extend the activities above to the other developing countries.

While the Energy Foundation continues to fund some of the activities above, it has limits. First, the scope of the Foundation is limited to China and the U.S. alone. Second, the size of the Energy Foundation—US\$30 million in grants annually for U.S. and Chinese programs altogether—is not enough to cover the wide range of financial needs for energy efficiency policy development in East Asia. The Policy Development Fund proposed here will complement the activities of the Energy Foundation so that it can further accelerate the energy efficiency policy of the Chinese automobile sector ranging from standards setting, revision, implementation, monitoring, enforcement and *ex-post* evaluation, as well as the introduction of hybrid and alternative fuel vehicles. The Fund can similarly assist the energy efficiency policies of other East Asian countries.

From a practical point of view, it would make sense for the Policy Development Fund to begin by co-financing ongoing activities with the

Energy Foundation in order to share personnel and institutional networks as well as lessons learned, and then gradually acquire its own capacity to develop projects in the areas and countries that are outside the scope or means of the Energy Foundation.

*c) Energy implication*

While the overall impacts of the fuel economy standards are yet to be analyzed, we can do a rough calculation to see the order of magnitude of the implications on energy. The Chinese automobile sector consumed 90 million tonnes of oil in 2003. If standards cut this use by 10 per cent, nine million tonnes of oil would be saved, amounting to 23 Mt CO<sub>2</sub>. Support from the Energy Foundation on fuel economy standards so far has been roughly US\$300,000 per year. By simply dividing the latter by the former, the results are US\$0.04/barrel and \$0.01/tonne CO<sub>2</sub>. Both are very small compared to current oil and CO<sub>2</sub> prices that are roughly US\$50 per barrel and \$30/tonne CO<sub>2</sub> at the time of writing. It would surely be worthwhile for donors to invest, as it enhances energy security and mitigates climate change.

Of course, there are many questions about these assumptions, particularly regarding costs and benefits. The concepts are complex for energy efficiency improvement because manufacturers and consumers bear additional upfront costs on one hand, while consumers accrue economic benefits from better fuel economy on the other. Furthermore, oil producers and providers will suffer from reduced revenue. Yet, we are performing the right calculation in light of the objective of international cooperation by the Policy Development Fund. From the donors' point of view, what matters is the amount of money granted to developing countries versus (1) energy demand eased, which means fewer security concerns in the region, as well as (2) CO<sub>2</sub> emission cuts. The rough calculation demonstrates the effectiveness of policy development assistance in this context. There may be some failures in practice, some wrong parameters in calculation and fewer rewards in other countries, but it seems quite certain that policy development assistance would be a very cost-effective measure to mitigate energy tensions and cut CO<sub>2</sub> emissions in East Asia.

iii) Low-rolling resistance tires

*a) Background*

Only about 10–20 per cent of the potential energy in gasoline is actually converted into a vehicle's motion. The remaining 80–90 per cent is lost through thermal, frictional and standby losses in the engine and exhaust system (Michelin, 2003). One way to improve the overall conversion efficiency is to reduce the rolling resistance of the vehicle's tires. The rolling resistance is not a measure of a tire's traction or "grip" on the road surface, but rather a measure of how easily a tire rolls on a surface. A tire with low rolling resistance min-

minizes the energy wasted as heat between the tire and the road, within the tire sidewall itself, and between the tire and its rim.

Rolling resistance of the tires is responsible for about 20 per cent of a vehicle's fuel consumption. If the tire is under-inflated or not properly aligned, then additional losses occur. Rolling resistance is typically measured on a complex machine resembling a dynamometer where the actual resistance is expressed in kg/tonne. A 10 per cent reduction in rolling resistance will translate into roughly a one per cent reduction in a vehicle's fuel consumption, although other factors will of course play a role (Duleep, 2005). One rule of thumb is that tires with low rolling resistance can reduce a passenger car's fuel consumption by as much as five per cent and a truck's fuel consumption by 10 per cent.

Recent studies have revealed a surprisingly wide range in rolling resistance among tires. Table 6.2 illustrates the range observed among popular tires sold in Europe (Penant, 2005).

**Table 6.2. Measured rolling resistance of selected tires in the European Union in 2005.**

	Observed Rolling Resistance of Tires(kg/tonne)	
Passenger cars (for new cars and replacements)	14	7
Trucks and buses	8.5	5.5

Source: Penant (2005)

The study also showed that there was no correlation between important performance characteristics, such as traction and durability, and rolling resistance. In other words, it was possible to purchase a safe, long-lived tire that also had low rolling resistance. Most of the tires for passenger cars had resistances between 10 and 13, so there is considerable opportunity for improvement. Tires in developing countries will typically have higher rolling resistance because they rely on older technologies.

The situation is different in North America and Japan because auto manufacturers have used tires with very low rolling resistance as part of their strategy to comply with fuel economy regulations. Sometimes manufacturers equip vehicles with low rolling resistance tires for other reasons. In China, for example, Buick equipped its compact cars with ultra-low rolling resistance tires in order to highlight the vehicle's efficiency (The New York Times, 2006). Buick claims that this action reduced fuel consumption by two per cent. Curiously, Buick does not offer these tires anywhere else in the world.

The rolling resistance of tires in the replacement market is higher than what's offered on new cars (especially in North America), so the fuel savings from low rolling resistance tires are lost after the original tires wear out. Unfortunately there is no way for consumers to identify and purchase tires with low rolling



resistance because they are not labeled with this information. There are several different procedures to measure rolling resistance, so governments cannot immediately establish a Web site or labeling program.

Several countries have begun programs to address rolling resistance in tires. The European Union is working with tire manufacturers to establish either mandatory or voluntary targets for rolling resistance. The state of California has proposed an information program and possibly maximum levels for rolling resistance.

*b) What the Fund would pay for*

The Fund would support cooperation between government regulatory agencies, tire manufacturers, auto manufacturers and other interested parties to lower the rolling resistance of tires. For example, the Fund might pay to develop the infrastructure to test, label and possibly regulate rolling resistance of tires. Some of the program development steps might include:

- creation and operation of an independent test laboratory to measure tire rolling resistance;
- sponsoring round-robin (or “chain”) comparisons of manufacturers’ test laboratories to improve quality controls;
- creation and maintenance of a database of rolling resistance measurements;
- estimation of energy savings from various policies to lower rolling resistance;
- evaluation of the cost-effectiveness of different levels of regulation;
- development of an energy efficiency label for tires;
- random verification of manufacturers’ claims of rolling resistance; and
- special programs to encourage low rolling resistance tires in trucks and buses.

The Fund could support other activities depending on a government’s desire to address the problem or manufacturers’ willingness to participate. Indeed, the Fund’s first task would be to decide what programs would be most effective to support.

**iv) Voluntary Agreements in Industry**

*a) Background*

Voluntary agreements (VAs) are “contracts between the government and industry” that set “negotiated targets with commitments and time schedules on the part of all participating parties” to improve energy efficiency and/or

reduce greenhouse gas emissions (International Energy Agency, 1997). These agreements typically have a 5–10 year timeframe for participants to plan and implement changes. The main advantage of voluntary agreements is that they focus sustained attention on energy efficiency and/or emissions reduction goals, instead of a campaign-style approach in which attention disappears at the end of a short period of intense activity. Starting in the 1990s, voluntary agreements by industry have significantly improved efficiency in industrialized countries. While there are certainly examples of programs that did not work, successful programs have doubled rates of efficiency improvement compared to rates without the programs. Voluntary agreements spur technological adaptation and innovation by encouraging companies to invest in energy efficiency and by creating a market for energy-efficient products (Delmas and Terlaak, 2000; Dowd, Friedman and Boyd, 2001).

The first step in a voluntary agreement is a decision on targets. Governments typically use incentives and disincentives to encourage industry participation. Supporting programs and policies, such as facility audits, assessments, benchmarking, monitoring and information dissemination plays an important role in helping participants understand and manage their energy use and greenhouse gas emissions. Some of the more successful voluntary agreement programs also offer tax reductions. In the United Kingdom, companies participating in voluntary agreements are eligible for an up to 80 per cent rebate on fuel consumption taxes. If implemented within a comprehensive and transparent framework, international experience shows that voluntary agreements are an innovative and effective way to motivate industry to improve energy efficiency and reduce related emissions (Croci, 2005).

China is showing increased interest in this approach. Under a program initially sponsored by the Energy Foundation, two steel plants in Shandong entered into pilot voluntary agreements. These pilot agreements had several important supporting policies, but were missing some of the financial incentives found to be important in other countries. Nevertheless, initial results were deemed successful enough that a number of local governments began instituting VA programs of their own, and the national government has made VAs an element in a major energy efficiency initiative financed in part by the GEF. UNDP is overseeing this program, the End-Use Energy Efficiency Program, which has US\$1.5 million allocated for additional pilot agreements with 12 enterprises in the steel, cement and chemical industries.

There is potential for China to integrate a voluntary approach into a new program being designed to monitor the energy performance of its top 1,000 energy-consuming industrial enterprises. This “Top 1,000” program will incorporate “energy efficiency agreements” overseen by local governments, with benchmarking to domestic and international standards, target-setting, auditing, monitoring, technical and financial supporting policies, and

annual and five-year evaluations.<sup>2</sup> The U.K. is currently advising China on the Top 1,000 program based on its experience with *Climate Change Agreements and Climate Change Levy*,<sup>3</sup> and may second a staff member to Beijing for a significant portion of 2006 for this purpose.

Despite the presence of these and other assistance projects (such as the European Union's Energy and Environment Program<sup>4</sup>), there is still significant room for additional efforts to broaden and accelerate the implementation of VAs. A great deal of work is needed in designing supporting policies, i.e., the fiscal and tax measures and technical assistance needed to encourage investment, as well as in building the institutions of implementation, particularly independent, objective monitoring and assessment systems.

*b) What the Fund would pay for*

The fund could leverage its contribution by supporting one key aspect of VA development. As just one example, the Fund could develop a government standard on industrial energy management systems that would be implemented as part of the Top 1,000 program. The standard would require companies to adopt a "best practices" approach to energy efficiency and document results, e.g., through existing ISO documentation procedures, or adopting practices from Japan or other countries that have demonstrated successful approaches. To be effective, energy management programs require training, which could be offered as part of a voluntary agreement, and also partly supported by the Fund. The energy management system standard would be flexible, non-prescriptive (in the sense of not recommending specific technologies or energy targets) and verifiable. Compliance with the standard could be a condition for remaining in the Top 1,000 program. Complementarity with ISO management systems could also be contemplated in designing the energy management system standard.

There are other examples that could be put forward. The keys would be (1) to work with the appropriate agency in China to define a specific task within the larger VA program that would benefit from international participation; (2) to coordinate the activity with other international organizations currently involved in the sector; and (3) to ensure that the principles abstracted from experience from abroad are applied to the circumstances that currently exist in China rather than attempting to transplant an activity that was developed under very different conditions.

---

2 Wang Xuejun, Professor, College of Environmental Sciences, Peking University (April 2006), personal communication.

3 For further information, see: <http://www.defra.gov.uk/Environment/ccl/>

4 For further information, see: [http://www.delchn.ccc.eu.int/en/Co-operation/Project\\_Fiches.htm](http://www.delchn.ccc.eu.int/en/Co-operation/Project_Fiches.htm)

*c) Energy implications*

Programs that target the industrial sector are essential to meeting China's ambitious targets for improving efficiency, such as the much-reported target of reducing overall intensity of the economy by 20 per cent from 2005 to 2010. Industry consumes about 70 per cent of total commercial energy in the country (National Bureau of Statistics, 2005). In 2004, the top 1,000 enterprises accounted for nearly half of this, or about 33 per cent of total energy consumption.<sup>5</sup> If these agreements can assist the enterprises to improve energy efficiency by an additional five per cent over the next five years, if there is 10 per cent annual growth in energy use at these large firms (assuming continued strong economic growth and increasing market share of China's large firms), VAs could help to reduce energy use by the equivalent of about 75 Mt of coal per year. While this represents less than three per cent of current energy use, it is still a large potential gain from a single program, and in a sector that has been notably lacking in effective policy activity in recent years.<sup>6</sup>

**C. Political feasibility with key stakeholders**

Political feasibility is necessary for the success of any policy proposal. A well-designed incentive structure is crucial. In what follows, we assess the political feasibility of the Fund proposal in terms of costs, benefits and incentive structure.

*Macro-level*

On the macro-level, the Fund addresses many key national interests as we discussed in section 2.3. The benefits include energy security, economic efficiency, pollution reduction and climate change mitigation. Some of these national interests have been present for decades, but some are new, and the importance of energy efficiency policy is constantly increasing, given burgeoning economic development, energy consumption growth, mounting environmental concerns and territorial tensions in the region. The time is ripe for further enhancing regional cooperation on energy efficiency policies that fit well with the national interests of all sides.

*Micro-level*

Macroscopic incentives at the national level are not enough for an international policy to be stable. In what follows, we will carefully assess the costs and benefits of key actors to see the political feasibility of the Fund proposal.

---

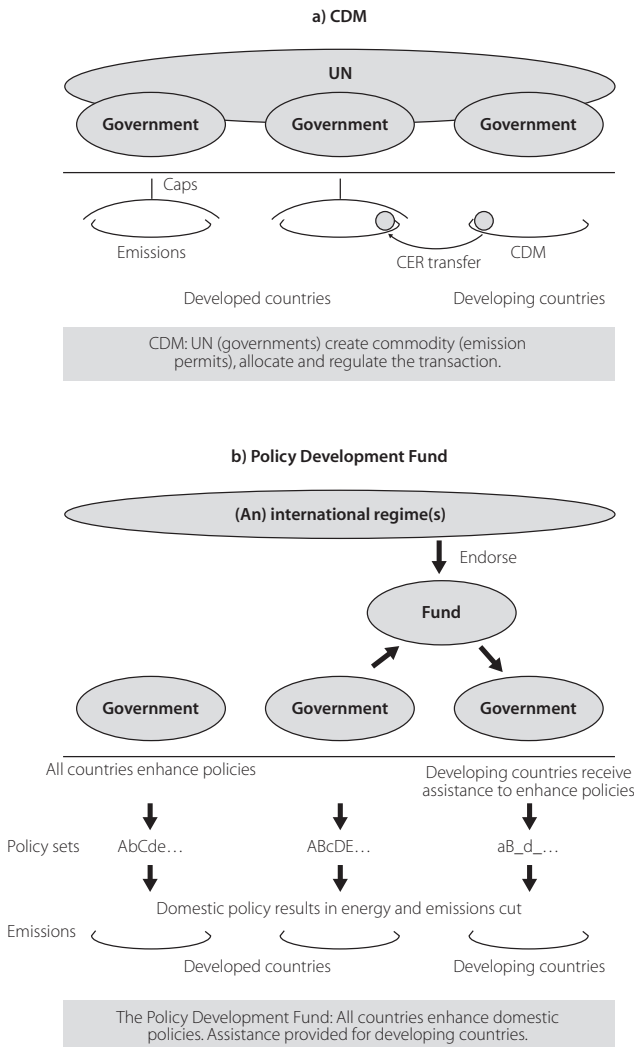
5 Wang Xuejun, Professor, College of Environmental Sciences, Peking University (April 2006), personal communication.

6 It is also worth noting that the planned Top 1,000 program would contain elements that are essential to the design of CDM projects. In particular, the benchmarking, target-setting and regular reporting of energy performance have the potential to set a credible basis for reporting emissions reductions that meet strict definitions of additionality.

*Division of responsibility between the government and private sector*

The division of responsibility in the Fund is that the national governments set regulatory systems, the private companies provide technical support in developing the regulatory systems, and do their profit-maximizing business within these regulatory systems. It is important to note that each of these elements is feasible and this division of responsibility is in harmony with their ordinary division of responsibility on any business activities.

**Figure 6.3 The division of responsibility between the public and private sector in (a) CDM and (b) The Policy Development Fund.**



It is in strong contrast with the CDM which has many barriers to widespread implementation as we reviewed in Chapter 2. With CDM credits, the international organizations (UNFCCC, COP, EB and the Panels) create a commodity (emission permits) and control the flow of the commodity across countries. It is different from any other commodities for which commercial transactions exist in the first place, and the regulatory system kicks in later to modify the existing commercial transactions. For most commodities, except for the CDM, the role of the international organizations is not to create the commodities but to modify the flow of commodities. While the CDM is facing such an unprecedented challenge, and its future remains highly uncertain, the Policy Development Fund relies on traditional divisions of responsibility which has proven to be successful in policy development for energy efficiency in many countries.

#### *Donor countries*

Japan will be the most important donor country in the region. Judging by the amount of money spent in the area of climate change and international cooperation, including official development assistance (ODA), the proposed budget of US\$10–30 million per year at the beginning, seems feasible considering the benefits outlined below.<sup>7</sup>

The benefits of the Fund to Japan (and any other potential donors) are huge and multi-faceted, as described above. In addition, political support will be secured since the Fund's principles will resonate well with the Japanese people, who have strong confidence in technology, particularly in energy efficiency. Also, they are generally willing to cooperate with other Asian countries. This combination of characteristics will be attractive to political leaders.

However, in the course of interviews with Japanese policy-makers, we found that there was some skepticism about the Fund because they thought that developing countries, in particular China, are rich enough to implement energy efficiency policies if they are really interested in them. As evidence of this wealth, they pointed to the build-up of arms, including the navy and nuclear missiles, the space station program, nuclear power development, Chinese strategic ODA to less developed countries, including North Korea and Pakistan, and the luxurious lifestyles of the emerging rich class in big cities. They are also worried that China's strength is disturbing the welfare and peace of neighboring Asian countries.

---

<sup>7</sup> We think the budgetary size is feasible based on a rough comparison with the potential budgetary sources in Japan. Major budgets relevant to climate change and energy efficiency policy include: "global warming budget," which is JPY 1.3 trillion or US\$13 billion at the exchange rate of US\$1=JPY100; "special account for oil-substitute" is JPY 0.5 trillion or US\$5 billion; "special account for power locating" is JPY 0.5 trillion or US\$5 billion. These two special accounts are dedicated for energy security and climate change mitigation. ODA to China is decreasing, but still as much as JPY 0.2 trillion, or US\$2 billion in FY2005. There can be political feasibility if the contribution to the Fund is small relative to the budgets. US\$10 million initially and increasing it to US\$100 million in the long run for energy security and climate change mitigation would be feasible in this regard.

The authors understand these concerns but think differently. First, China is going to be a superpower anyway. In more than 2,000 years of East Asian history, China has been the strongest and biggest country in the region, with the past several decades being rather exceptional.

Second, being a big economic and political player *per se* is not the source of the problem. What matters more than size are China's characteristics. If China loves peace and appreciates the environment, it will be a most reliable and close friend to all countries in the region. If China is expansionist and refuses to cooperate in securing the environment, it may pose a serious problem regardless of China's size. What we should do is to work with China so that it grows smartly, with more economic efficiency, more trade and investment with the world, good integration with the global system, and sharing the same key values as the rest of the world in terms of peace and the environment. If the rest of the world is reluctant to assist China to grow peacefully in an environmentally-friendly way, there would be a danger that China would become hostile to the rest of the world, expansionist and would damage the global environment.

Third, even if developing countries have enough financial resources as a whole, and the awareness for energy conservation policy is high at the political level, it is often the case that the office in charge of energy efficiency policy is understaffed and poorly funded. Any national system, particularly if it involves budgetary and personnel issues within government, is difficult to change in a short time. By filling the gap, the Fund will be critical for putting energy efficiency policy in place.

Fourth, despite all possible efforts to keep countries prosperous and peaceful, the region may become politically unstable. Establishing a link and keeping a network of people involved in energy efficiency cooperation will be useful for preventing such political failure and will serve as a safety net for maintaining contact within the group of people across political boundaries in case of such failure.

Overall, when we talked with Japanese policy-makers and stakeholders from government and industry, we found that they were generally in favor of the idea of the Fund and they agreed that there are common national interests in energy efficiency improvement. They had mixed views about Japan's past experience in energy efficiency cooperation, but agreed that new concepts are needed given the changing national circumstances in the region.

From the interviews, we also found that the concept of policy development assistance was not yet well understood in Japan, so it may be worthwhile to elaborate and promote the concept further. Moreover, those who understand the concept wonder if it might be too intrusive to be accepted by developing countries, given that the memory of World War II remains fresh in some countries.

Regarding the last point, however, our literature research and interviews with policy-makers and business stakeholders in developing countries revealed that recipient countries would not see the Fund as problematic if it was carefully designed; voluntary, not mandatory, in nature; focused at the technical level (not comprising overall policy reform, such as IMF structure adjustment); and was in a multilateral, not a bilateral, setting. Our Fund proposal reflects these inputs.

#### *Recipient countries*

The benefits of the Fund for the recipients are multi-faceted and significant, as described above. Our series of interviews revealed that they are generally favorable to the concept of the Fund. Moreover, they are already accustomed to the concept of policy development assistance in the area of energy efficiency. This means that Japan does not have to worry if it is not politically feasible.

Another important aspect is that the proposal is in line with current policy direction. In China, energy in general has received increasing political attention in recent years. Our interviews underscored that there is a renewed will to do something about improving efficiency as represented by the ambitious Chinese long-term plan (see section 2.2 for details).

#### *Manufacturers of traded appliances and automobiles*

International manufacturers—or their affiliates for traded appliances and automobiles—benefit from the Fund’s activities, or at least are not adversely affected by them. Promotion of energy efficiency policy for standards and labeling in particular, sometimes associated with the harmonization of testing patterns, will provide a competitive edge to international manufacturers with the capacity to incorporate cutting-edge technologies to their products.

On the other hand, minor and local manufacturers may consider Fund activities bad for their business if they lack the capacity to incorporate cutting-edge technologies. They may fail to comply with more stringent requirements for energy efficiency improvement.

In the real world, actual regulatory levels are the outcome of trilateral politics among frontrunner manufacturers, laggard manufacturers and governmental regulatory authorities in each county. Consumer groups and NGOs sometimes join these politics. Moreover, another economic dimension exists in the context of China. There is a tension between the central regulatory authorities, who want to promote more energy efficiency policy from a national energy security perspective, and local governments that want to keep their local economies running. Both have legitimacy and the Fund will never aim to change the structure. What the Fund will do is facilitate the process by providing better information to all sides so that there will be better outcomes for all. The Fund does not prescribe the answer and the final say is always left to the individual recipient country.



*Manufacturers of traded raw materials*

Steel, cement and non-steel metals are examples of traded raw materials. Manufacturers of traded raw materials in developed countries may find it is against their interests for their governments to donate to the Fund. This is true if the Fund activities result in more efficient production from competitors in recipient countries that reduce markets for the products made in developed donor countries. These are legitimate concerns.

However, four remarks address these concerns. First, the companies in developing countries will also bear the short-term upfront costs of meeting energy efficiency requirements, even if they have higher cost savings and competitiveness in the long run. It is fair competition because the fruits are not given for free, but are available only to those who make a series of efforts by themselves.

Second, the scheme is much more acceptable than the CDM, in which additional investment costs for energy efficiency improvement are borne by the developed countries. That means manufacturers located in developing countries do not have to bear any costs for energy efficiency improvement. While it could be legitimized by North-South philosophical debates, doing this on a massive scale would be unacceptable to manufacturers in developed countries.

Third, international manufacturers based in developed countries often have affiliated companies in developing countries. They will surely have a competitive advantage over the local and minor manufacturers in developing countries that do not possess the technological capacity to meet more stringent energy efficiency requirements. As such, the joint profits of the cross-border companies are not necessarily negative. Altogether, costs and benefits are difficult to assess for these manufacturers in general, and perhaps differ among companies.

Fourth, even if some raw material manufacturers from developed countries become less competitive, stricter requirements for energy efficiency in developing countries may open up more attractive business opportunities. They include high-tech materials for insulation and lighting in buildings, strong and light materials for automobiles, and engineering services with information technologies.

Given the considerations above, manufacturers in developed countries are not likely to be the losers. Rather, the more obvious potential losers are, again, local and minor manufacturers in developing countries. The same considerations for manufacturers of traded appliances and automobiles apply here. The Fund's activities should not be intrusive, but should provide technical assistance for consideration, and leave final decisions to each sovereign country for finding a balance among the many legitimate concerns, including the development of local manufacturing capacity and local employment.

Given the above considerations, the Fund activities for the manufacturing sector and traded raw materials are, as a whole, an attractive option for govern-

ments in developed as well as developing countries, with different consequences for individual manufacturers.

#### *Manufacturers of non-traded products*

The power utility and building sectors are examples of non-traded products. In this category, there is less conflict of interest between manufacturers from developed countries and those from developing countries. The market is closed in each country, so there is no competition between countries. For example, China will not export electricity to Japan even if it achieves higher efficiency and lower costs.

#### *CEO and the Secretariat of the Fund*

Unlike other players, the CEO and Secretariat are less interested in mundane benefits than in value. Salaries are of course necessary, but the most talented people in the world working in the area of energy efficiency and climate change cooperation are primarily working for values such as better environment; a good life; more energy security and peace; and more affordable standards of living for the poor. Providing the institutional platform, political endorsement and appropriate funding to these people, and asking for their devotion, are the keys to success.

### **D. Cost-effectiveness of the Fund**

With the Fund proposal, we can cover a wider range—energy product markets, sectors or nations—in order to transform the national energy equipment market toward more efficiency, rather than addressing energy savings at a single site.

If donor countries have infinite resources and recipient countries are willing to take advantage of the cost-effective opportunities afforded by energy efficiency policy, then the energy saving potential of the Fund activities is equal to the technical potential of the energy savings in recipient countries. Let us call it the theoretical potential.

However, there are two factors that prevent the theoretical potential from materializing. One is the cost-effectiveness of the projects under the Fund and the other is the donor countries' willingness to pay. Let us name it practical potential and examine it. The project examples provided in item B(i) and B(iii) above showed a rough estimate that the most effective projects can be executed at the range of US\$0.10 per ton of CO<sub>2</sub> or less in terms of the amount of foreign aid donated versus a ton of CO<sub>2</sub> saved. To be conservative, let us assume the costs are US\$1 per ton of CO<sub>2</sub>. The willingness to pay by the donor countries is not easy to estimate, but the authors think US\$100 million per annum will be feasible.<sup>8</sup> Dividing the latter by the former makes 100 million

---

<sup>8</sup> This guess is based on a rough comparison with the potential budgetary sources in Japan. See footnote 7 for the discussions on feasibility.

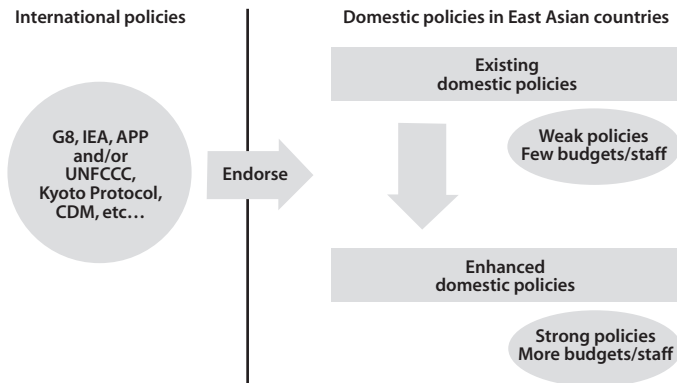
tons of CO<sub>2</sub> per annum. This is a significant amount compared to Chinese annual CO<sub>2</sub> emissions from the energy sector of 4,100 million tons (in 2003), and Japanese annual CO<sub>2</sub> emissions from the energy sector of 1,200 million tons (in 2003). Of course, if the cost-effectiveness is as high as US\$0.10 or less as the rough calculation provided in the item B(i) and B(iii), then the practical potential will reach the theoretical potential of Asia. If wisely done, most energy efficiency potential in East Asia can be realized at a level of US\$100 million per annum.

So far, the calculation has been done in terms of the amount of money donated to the Fund versus the CO<sub>2</sub> saved. However, different calculations can be done. If the Fund is a “revolving” fund, or a fund to which the revenues accrued from energy savings are recycled, then there is no need for continuous payment, but only one upfront contribution from donor countries. Such a revolving fund is possible since energy savings generally result in economic benefits for the recipient countries, although identifying the exact beneficiaries among many stakeholders is not a straightforward matter. Having a loan instead of a donation is a similar idea and would also be politically feasible.

### E. A future scenario

While it is unlikely that the Fund activities will be recognized as a CDM activity under the Kyoto Protocol in the very near future, it is possible that they will become part of the post-Kyoto framework after 2012 because the Fund provides opportunities for nations and companies alike to work on energy efficiency and climate change mitigation. The fund can be housed either under the UNFCCC or other schemes such as the Asia-Pacific Partnership for Clean Development and Climate (APP). See Figure 6.4.

Figure 6.4. International policy and the Policy Development Fund.



The Fund can be housed under any international regime.

In the current political context, it is unlikely that many countries, including China, the U.S. and Japan, will agree on a set of greenhouse gas emission reduction targets and timetables for 2012 and beyond in the UNFCCC process. Currently, the countries are very divided in the process. While COP-11 in Montreal decided that there would be a “dialogue” on the post-Kyoto regime, there have been such strong caveats that the dialogue would lead neither to negotiation nor commitment.

Against this backdrop, we describe a scenario in which the Fund will be established outside the UNFCCC, in order to share with the readers the possible development of the Fund over time. The scenario is not a prediction or desired future, but represents one potential direction for the future.

#### **Fund scenario and timeline:**

##### *2006*

Japan, Korea, China, the Philippines, Indonesia and the U.S. announce the establishment of the Policy Development Fund for Energy Efficiency in East Asia. It is endorsed by the APP. The donor countries—Japan, Korea and the U.S.—announce they will pay US\$10 million annually for the coming five years.

Co-financing of energy efficiency policy development in the automobile sector of China begins in coordination with the Energy Foundation. Co-financing of standards and labeling programs in participating countries begins in coordination with CLASP.

##### *2007*

It becomes clear that only European countries remain in the binding emissions cap regime after 2012. Heated political debate in Japan as to whether it should remain in the regime or not without participation by any other non-European developed countries.

From this year on, a mounting number of “actions,” which are new laws, standards and other policies for energy efficiency are reported in the annual ministerial meetings of the Fund.

##### *2008*

The activities in 2007 are reported to the G8 summit in Tokyo. The estimate of cost-effectiveness is US\$0.10 per ton of CO<sub>2</sub> donated. The estimate of total CO<sub>2</sub> reduction is 100 million tons of CO<sub>2</sub> per annum. The estimated emission reductions by energy saving outpace those from the CDM. While total emissions are increasing in most countries, the development of this institution is welcomed as a good signal for change. The G8 ministers celebrate the success of the Fund. Japan announces plans to increase its donation to the Fund to US\$30 million per year. Some major international companies also begin donating to the Fund as part of their voluntary demonstration of corporate social responsibility (CSR).

2009

The Fund begins to address new projects including industrial boiler efficiency improvement and industrial voluntary agreements to improve efficiency in China.

2010

The progress of energy conservation policy attracts interest from non-member developing countries that wish to improve their economic efficiency and global competitiveness, and membership increases. Attracted by the record of success, more developed countries with environmental concerns join the funding mechanism. By this year, most of the ASEAN countries and India have joined the Fund as recipients. European countries also join the Fund. African and Latin American versions of the Fund are established.

2011

Manufacturers increase their expectations of more stringent global energy efficiency regulation in the future. They agree with the government to tighten the efficiency standards and labels in developed countries given the mounting expectation that highly-efficient appliances will find the Asian market in the near future.

### **6.3 Summary**

In this chapter, the Policy Development Fund for Energy Efficiency in East Asia is proposed. The Fund is intended to meet the national priorities of participating countries; to aim for massive energy savings and significant emissions reductions through market transformation and leverage of private sector resources; and to commit to concrete actions and support policy mechanisms for such actions.

The major characteristics can be summarized as follows:

#### **1. Political agreement**

*The Fund begins with a small number of countries and expands later.* It starts with multilateral agreement from the outset to avoid capture by narrow interests, but the number of initial participants is kept small to emphasize areas of agreement and achieve alignment of interests.

#### **2. Design of the Fund**

- *The Fund is new and dedicated to energy efficiency.* A new and dedicated fund can respond more quickly, in contrast to the lengthy project procedures required by international organizations established for other purposes, such as development aid.

- *The management structure (CEO, Executive Board, staff) is independent and professional* in order to insulate itself from short-term political changes.
- *The activities are restricted to the region and to energy efficiency only* to secure the alignment of interests and effective management.
- *Like-minded countries in East Asia join the independent Fund.* Financial contributions are voluntary. Expected initial scale: US\$10 million annually. Private sponsors may also contribute.
- *The Fund supports formulation and initial implementation of energy efficiency policy* in member countries. Recipients commit themselves to implementation.
- *Recipients, not donors, retain discretion* over types and stringency of policy measures.
- *The CEO makes decisions*, including project selection, under the guidance of the Executive Board. The CEO is nominated by the Executive Board.
- *Projects are selected by the CEO using cost-effectiveness as a key criterion.* Cost-effectiveness is defined as energy savings or CO<sub>2</sub> reductions per amount of grant.
- The Fund supports *new projects and provides co-financing* for existing efforts.

### **3. Projects**

The Fund's potential target technologies and sectors vary widely, given the broad definition of the Fund—policy development for energy efficiency. Since nearly all sectors in developing countries need further policy development ranging from information gathering, law stipulation, standard-setting, monitoring, enforcement and revision, there is almost an infinite list of potential areas of cooperation. An indicative list of projects is provided in Table ES1. Four examples are provided in section 6.2 B to further illustrate how the Fund works.

The estimates of the cost to a government to institute and maintain an energy efficiency policy that induces cost savings, energy savings and emission reductions have been scarce so far, but some early estimates indicate that the costs are typically less than US\$0.10 per ton of carbon.

## **A Final Word from Co-editor, Taishi Sugiyama**

During the interviews with stakeholders in Japan—my country—I was asked a very interesting question. After listening to my presentation on existing international expert networks to promote energy efficiency worldwide, one of the stakeholders asked me:

Why are people from outside the region working on East Asian energy efficiency? Are there any national interests behind it, or, are there any plots? Personally, I don't think they will become millionaires by doing this. They must have grown up in a wealthy family without worrying about anything. It is not easy to believe that they are doing this just out of good will.

I found that to acquire wider confidence from stakeholders, the experts have to explain who they are and why they are doing such work. Intrigued, I conveyed this question to an expert from outside Japan who is involved in this work. He replied as follows:

I suspect that each of us have slightly different motivations, but perhaps you'll see a common thread to them. In my case, here are some pertinent facts:

1. I have two married children and four grandchildren.
2. I'm comfortably well established (economically) and have no ambition to accumulate more money.
3. I developed, in my youth, an expectation of how my country and the world were evolving with increasing economic prosperity that would continuously result in a higher quality of life, increased economic equality, and increased understanding and tolerance among the peoples of the world.
4. My entire career, indeed, my entire life has been devoted to compassionate support for other people and to leaving this planet a better place than when I entered it (in terms of what I viewed as desirable human evolution). I, therefore, want to do what is best for my grandchildren (not as individuals; but as representatives of mankind).
5. My devotion to the international expert network for energy efficiency is a reflection of these values and conditions.
6. I have recently realized that the world is not evolving as I had envisioned in my youth; that increased economic prosperity in my country has not increased the quality of life; that the majority of my fellow countrymen do not share my vision; and that my government's funding for what I care most about is rapidly decreasing.
7. My support for energy efficiency cooperation among Asian countries is a better use of my time than other opportunities I find in my country, and is complementary to my endeavors with the international expert network.

That's it in a nutshell. Albeit a bit oversimplified, I think it captures the essence of my decision to participate...

In short, experts are working toward the goal of energy efficiency. Immediately after this conversation, I realized that it is not difficult for me to understand since the same goes for myself. I am also working for my values.

In conclusion, I am happy to report to potential donors to the Fund about the research team's motivations. They have been working hard out of personal conviction and professional passion, but have not yet secured significant and stable support from any national government. That is why they are always struggling for funding for their activities. We have found that what they are doing is promising. Those who fund this expert network will be making a cost-effective investment.





## References

- Alliance to Save Energy (2005) "EEIP in China." Available online: <http://www.ase.org/content/article/detail/610>
- APEC EWG Secretariat (2002) "The APEC Energy Working Group: Operational Plan 2003." November. APEC Energy Working Group. Available online: <http://www.apecenergy.org.au/welcome/background/plan/>
- ASEAN Centre for Energy (2003) "SOME – METI Co-operation." Available online: <http://www.aseanenergy.org/cooperation/some-meti/esspa/esspa.htm>
- ASEAN Ministers on Energy (2004) "ASEAN Plan of Action for Energy Cooperation (APAEC) 2004-2009." Adopted at the 22nd ASEAN Ministers on Energy Meeting (AMEM). Available online: [www.aseansec.org/pdf/APAEC0409.pdf](http://www.aseansec.org/pdf/APAEC0409.pdf)
- Asia Gas & Power – News (2004) "European COGEN Program Nears End." *Energy Argus*. 18 August. Available online: <http://www.cogen3.net/doc/articles/Europeancogenprogrammenearend.pdf>
- Asian Development Bank (1996) "ADB Approves \$178 Million Loan to the People's Republic of China for Industrial Energy Efficiency and Environment Improvement." Asian Development Bank. Available online: <http://www.adb.org/Documents/News/1996/nr1996050.asp>
- Asian Development Bank (2005) "Energy Conservation and Resource Management Project." Available online: <http://www.adb.org/Documents/Profiles/PPTA/39020012.ASP>
- Baldinger, P. (2002) "Lean and Green: Boosting Chinese Energy Efficiency through ESCOs." *China Environment Series*, Issue 5. Available online: <http://wwics.si.edu/topics/pubs/ACF3C9.pdf>
- Birner, Sabrina and Eric Martinot (2005) "Promoting energy-efficient products: GEF experience and lessons for market transformation in developing countries." *Energy Policy* 33: 1765-1779.
- China Automotive Technology & Research Center (2003) *Research on Chinese Auto Fuel Economy: Standards, Regulation and Policy*. Joint entrusted research project of China State Economy and Trade Commission/US Energy Foundation.
- China Climate Change Info Net (2004) "Jingdu yidingshu shengxio zaiji Zhongguo jingji zaoyu qihou yali" (Kyoto Protocol soon to go into effect – China's economy will encounter climate pressure), <http://www.ccchina.gov.cn/index1.htm> (First published in *Global Times Huanqiu shibao* 27 December 2004).

China Standard Certification Center (CCEP) (2005) "Governmental Procurement Policy for Energy Efficient Products Launched in China." China Standard Certification Center. Available online:

<http://www.cecp.org.cn/englishhtml/showpage.asp?newsid=30>

[http://www.oit.doe.gov/international/st1\\_eebd.shtml](http://www.oit.doe.gov/international/st1_eebd.shtml)

Christoffersen, L., Davidson, O., Donoso, M.C., Fargher, J., Hammond, A., Hooper, E., Mathew, T., and Seyani, J. (2002) *The First Decade of the GEF: Second Overall Performance Study*, Global Environment Facility, Washington DC.

Clermont-Ferrand, Michelin (2003) *The Tyre: Rolling Resistance and Fuel Savings*, Société de Technologie.

Collaborative Labeling and Appliance Standards Program (CLASP) (2004a) "Background on CLASP." Available online: <http://clasponline.org/about.php3>

Collaborative Labeling and Appliance Standards Program (CLASP) (2004b) "Current CLASP Projects." Available online: <http://clasponline.org/project.php3?no=16>

Croci, Edoardo (ed.) (2005) *The Handbook of Environmental Voluntary Agreements*. Dordrecht, The Netherlands: Springer.

Delmas, M. and Terlaak, A. (2000) "Voluntary Agreements for the Environment: Innovation and Transaction Costs," CAVA Working Paper 00/02/13, February.

Dowd, J., Friedman, K, and Boyd, G. (2001) "How Well Do Voluntary Agreements and Programs Perform at Improving Industrial Energy Efficiency," Proceedings of the 2001 ACEEE Summer Study on Energy Efficiency in Industry, Washington, DC: American Council for an Energy-Efficient Economy.

Duleep, K.G. (2005) "Tires, Technology, and Energy Consumption," IEA Workshop on Energy Efficient Tyres: Improving the On-Road Performance of Motor Vehicles," International Energy Agency, <http://www.iea.org> 15–16 November 2005.

Efficient Lighting Initiative (2006) Available online: <http://www.efficientlighting.net>

Energy Foundation, China Sustainable Energy Program (CSEP) (2005) "China Sustainable Energy Program." Available online: [http://www.efchina.org/documents/CSEPbrochure\\_EN.pdf](http://www.efchina.org/documents/CSEPbrochure_EN.pdf)

Energy Foundation (2004) *China's Energy Challenge*. Annual Report. Energy Foundation, San Francisco. Available online: [http://www.ef.org/annual\\_reports.cfm](http://www.ef.org/annual_reports.cfm)

European Commission (EC), Delegation to Thailand (2004) Co-operation projects with ASEAN: EC-ASEAN COGEN Programme (COGEN III).” [http://www.deltheta.cec.eu.int/en/projects/asean\\_projects\\_cogen\\_III.htm](http://www.deltheta.cec.eu.int/en/projects/asean_projects_cogen_III.htm)

European Union (EU)-China Energy and Environment Programme (EEP) (2004) “Energy and Environment Program.” Available online: <http://www.energyandenvironment.org/index.php>

GEF (2002) *China GEF Newsletter*, Issue 1, September 2002. Available online: [www.gefchina.org.cn/gef/english/more/details.asp?id=6](http://www.gefchina.org.cn/gef/english/more/details.asp?id=6).

GEF (2002) *Project Brief: China End-Use Energy Efficiency Project*. GEF-UNDP. Available online: <http://gefonline.org/projectDetails.cfm?projID=966>

GEF (2001) *The GEF Programmatic Approach: Current Understandings*. May 9–11.

Heggelund, Gørild, Steinar Andresen and SunYing (2005) “Performance of the Global Environmental Facility (GEF) in China: Achievements and Challenges as seen by the Chinese,” *International Environmental Agreements: Politics, Law and Economics* (IEA), 5: 323-348.

International Energy Agency (IEA) (2006) *Light’s Labours Lost*, International Energy Agency/OECD, Paris.

International Energy Agency (IEA) (2005) *World Energy Outlook 2005*, Paris: IEA/OECD.

International Energy Agency (IEA) (2004) *World Energy Outlook 2004*, Paris: IEA/OECD.

International Energy Agency (1997) *Voluntary Actions for Energy-Related CO<sub>2</sub> Abatement*. Paris: OECD/IEA.

Institute for Energy and Economy of Japan (IEEJ) (2004) “Asia/World Energy Outlook,” IEEJ: Tokyo.

IPCC (2001) *Climate Change 2001: Mitigation – Contribution of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel on Climate Change. Cambridge University Press: Cambridge.

Japan Bank for International Cooperation (JBIC) (2005) “JBIC’s Environmental Activities.” Available online: <http://www.jbic.go.jp/english/environ/>

Japan International Cooperation Agency (JICA) (2004) “Dalian China Energy Conservation Training Center Project.” Available online: <http://www.jica.go.jp/english/evaluation/project/expo/as/archives/13-4-03.html>

Kagan, Robert A. and Lee Axelrad (2000) *Regulatory Encounters: Multinational Corporations and American Adversarial Legalism*. University of California Press: Berkeley.

McKane, A., G. Zou, R. Williams, S. Nadel, and V. Tutterow (2003) "China Motor Systems Energy Conservation Program: Establishing the Foundation for Systems Energy Efficiency." LBNL Report No. 52772. Available online: [http://eetd.lbl.gov/EA/indpart/publications/lbnl\\_52772.pdf](http://eetd.lbl.gov/EA/indpart/publications/lbnl_52772.pdf)

Metz, Bert, Ogunlade R. Davidson, Jan-Willem Martens, Sascha N. M. van Rooijen, and Laura Van Wie McGrory (2000) *Methodological and Technological Issues in Technology Transfer – A Special Report of IPCC Working Group III*. Cambridge: Cambridge University Press.

National Bureau of Statistics (2005) *China Statistical Yearbook 2004*. (Zhongguo tongji nianjian) (2004) Beijing: China Statistics Press (Zhongguo tongji chubanshe).

National Bureau of Statistics (2005) *China Statistical Yearbook 2005*, Beijing: China Statistics Press.

Nautilus Institute (1999) *Financing Clean Coal Technologies in China*. Paper and workshop proceedings. Nautilus Institute: Berkeley, California.

Nexant (2005) "Case Studies of Regional Energy Cooperation Programs: APEC and ASEAN." Report prepared for USAID SARI/Energy Program, Contract No. 386-C-00-03-00135-00. January. See: [www.sari-energy.org](http://www.sari-energy.org)

NDRC (2005) "China Medium and Long Term Energy Conservation Plan" (Jieneng zhong changqi zhuanxiang guihua). National Development and Reform Commission China Environmental Science Press: Beijing.

NDRC (2001) "The 10th Five-Year Plan for Energy Conservation and Resources Comprehensive Utilization." Available online: [http://www.chinacp.com/eng/cppolicystrategy/10th\\_5\\_energy.htm](http://www.chinacp.com/eng/cppolicystrategy/10th_5_energy.htm)

Ogden, Douglas (2006) "We Don't Need More Power," *Newsweek International*. February 6.

Ohshita, S.B. (2003) "Japan's Cleaner Coal Technology Transfer to China: The Implementation of MITI's Green Aid Plan." Ph.D. dissertation, Stanford University.

Ohshita, S.B. and Ortolano, L. (2006) "Effects of Economic and Environmental Reform on Diffusion of Cleaner Coal Technology in China." *Development and Change* 37(1): 75–98.

Ohshita, S.B. and Ortolano, L. (2003) "From demonstration to diffusion: the gap in Japan's environmental technology cooperation with China," *Int. J. Technology Transfer and Commercialisation* 2(4): 351-368.

- Ohshita, S. B. and L. Ortolano (2002) "The promise and pitfalls of Japanese cleaner coal technology transfer to China," *International Journal of Technology Transfer and Commercialisation*, 1(1/2): 56-81.
- Orr Jr., Robert M. (1990) *The Emergence of Japan's Foreign Aid Power*. New York, Columbia University Press.
- Penant, Christophe (2005) "The Challenge of Energy-Efficient Tyres," IEA Workshop on Energy Efficient Tyres: Improving the On-Road Performance of Motor Vehicles," International Energy Agency, 15–16 November 2005.
- PRC (2004) "The PRC Initial National Communication on Climate Change" (Zhonghua renmin gongheguo Qihoubianhua chushi guojia xinxi tongbao), Beijing: China Planning Publishing House (Zhongguo jihua chubanshe).
- Project Coordinating Committee (2004) "ASEAN-Australia Energy Policy and Systems Analysis Project." Available online: [http://www.aseanenergy.org/download/some-meti/8th\\_pcc\\_meeting/005%20-%20Agreed%20Summary%20Record%20.pdf](http://www.aseanenergy.org/download/some-meti/8th_pcc_meeting/005%20-%20Agreed%20Summary%20Record%20.pdf)
- Promoting an Energy Efficient Public Sector (PEPS) (2004) "Current PEPS Initiatives: China." Available online: <http://www.pepsonline.org/countries/china.html>
- Rix, Alan (1980) *Japan's Economic Aid: Policy-making and Politics*. St. Martin's Press: New York.
- Sauer, Amanda and Fred Wellington (2004) "Taking the High (Fuel Economy) Road: What do the new Chinese fuel Economy Standards mean for foreign automakers?" World Resources Institute: Washington, DC.
- Sinton *et al.* (2005) "Evaluation of China's Energy Strategy Options," Berkeley: LBNL.
- Sugiyama, Taishi, Takahiro Ueno and Jonathan Sinton (2005) The "Coalition for Climate Technology Scenario," in Sugiyama, Taishi editor, *Governing Climate: The Struggle for a Global Framework Beyond Kyoto*. IISD: Winnipeg.
- Sugiyama, Taishi, Kenichiro Yamaguchi and Hiroshi Yamagata (2005) "CDM in the Post Kyoto Regime: Incentive mechanisms for developing countries to promote energy conservation and renewable energies," Workshop Issue Paper, CDM in the Post Kyoto Regime, March 22 and 23, 2005. Tokyo.
- Tanaka, Kanako, Ryuji Matsuhashi, Masahiro Nishio and Hiroki Kudo (2006) "CO<sub>2</sub> Reduction Potential by Energy Efficient Technology in Energy Intensive Industry." Institute for Energy and Economy of Japan (IEEJ). March 2006.

The Development Research Center of the State Council (2005) *China's National Comprehensive Energy Strategy and Policy* (CNESP 2005).

The New York Times (2006) "Car industry grows bit by bit in China." February 17.

United States Department of Energy (US DOE) (2004) "China Status Report: Buildings." Available online: [http://www.oit.doe.gov/international/st1\\_eebd.shtml](http://www.oit.doe.gov/international/st1_eebd.shtml)

Van Wie McGrory *et al.* (2002) "Market Leadership by Example: Government Sector Energy Efficiency in Developing Countries." *Proceedings of the ACEEE Summer Study on Energy Efficient Buildings*. Asilomar, CA. August. [LBNL Report, on-line at <http://www.pepsonline.org/pubsandresources.html>.]

Watson, Jim (2002) "Cleaner coal technology transfer to China: a 'win-win' opportunity for sustainable development?" *International Journal of Technology Transfer and Commercialisation* 1(4): 347-372.

Werksman, J. (2004) "Consolidating Global Environmental Governance: New Lessons from the GEF," in K. Norichika and P. Haas (eds.), *Emerging Forces in Environmental Governance*. United Nations University, Tokyo, Japan, pp. 35-51.

Wiel, S. and Benoit Lebot (2006) "Regional Cooperation in Energy Efficiency Standard-Setting and Labeling." *Proceedings of the International Energy Efficiency in Domestic Appliances and Lighting Conference '06 (EEDAL'06)*, (forthcoming).

World Bank (1996) *China Efficient Industrial Boilers Project*. GEF Project Document. Report No: 16132-CHA.

World Bank (1998) "Project Appraisal Document on a Proposed Loan in the Amount of US\$63 Million and a Proposed GEF Grant of US\$22 Million Equivalent to the People's Republic of China for an Energy Conservation Project." World Bank, Energy and Mining Development Sector Unit, China Country Unit, East Asia and Pacific Regional Office. Report No: 17030-CHA.

World Bank (2002) "Project Appraisal Document on a Proposed GEF Grant of SDR 19.7 million (US\$26 Equivalent) to the People's Republic of China for an Energy Conservation Project." World Bank, Energy and Mining Development Sector Unit, China Country Unit, East Asia and Pacific Regional Office. Report No: 24883-CHA.

World Energy Council (2005) *China's Energy Supply. Many Paths – One Goal*. English Edition of 'Energy for Germany' by WEC's German Member Committee.

## References

World Energy Council (2004) *Energy Efficiency: A Worldwide Review, 2004*. World Energy Council, London. July.

Xu Binglan (2006) “Energy standards set for buildings” *China Daily*. 17 February.





# Cooperative Climate

## ENERGY EFFICIENCY ACTION IN EAST ASIA

Energy efficiency is high on the policy agenda in East Asia. How can we promote it most effectively? To answer this, *Cooperative Climate* reviews existing energy efficiency policy and international cooperation in East Asia. Drawing upon the rich lessons, an environmentally-effective, politically-feasible and cost-effective solution is proposed: an independent and dedicated Policy Development Fund for energy efficiency.

Design issues and a wide range of concrete projects under the Fund are discussed and future scenarios are considered. The authors conclude that fostering effective regional cooperation on energy efficiency is an important and practical way for East Asia to fight climate change.